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Color Photography

Yesterday, Today and Tomorrow

By W. T. CRESPINEL

Technical Advisor, Multicolor Films, Inc.

[Mr. Crespinel, author of this article, is one of the distinguished color scientists of the times. He has had wide experience in the development of color in cinematography and is competent to write on the subject with authority. In this particular paper Mr. Crespinel treats of the entire subject from its early beginnings and our readers will find it a most interesting and informative document. Mr. Crespinel has been of late years associated with Multicolor Films, Inc., 201 Occidental Boulevard, Hollywood, of which Mr. William Worthington is president.—Editor's Note.]

There is no branch of the Motion Picture Industry that has taken so long to find its appointed place in the scheme of things, as Color Photography. When one considers that motion pictures in natural color were exhibited as early as 1902, when even the ordinary black and white "movie" was but an infant and when a comparison is made between black and white and color today, twenty-seven years later—it is to wonder.

The color process mentioned was the brain child of two Englishmen, Lee and Turner. Their process was a three-color additive method. Here I should mention that all photographic methods that aim to reproduce natural color results are divided into but two classes and two only; namely, additive and subtractive. No matter what the scheme for reproducing color, it is either one of these two methods. Quite recently, while I was discussing color with a very prominent and long-experienced motion picture expert, I mentioned this fact to him. He thought for a moment and then looking at me, doubtingly, suggested: "Yes, but you cannot possibly know what every experimenter in color is doing." I again emphasized the fact that no matter how many experimenters were working on color photography or in what part of the world, their method was either additive or subtractive, or a combination of both. I left him still in doubt.

The additive methods of color photography are those similar to the old Kinemacolor method, whereby the colors are produced by a revolving color filter, and while it is formed by the addition of complementary colors, the positive, itself, carries no visible color, only latent color values. For example, let us presume that the subject to be photographed is a red apple with green leaves. These objects would be reproduced on the positive film thus: one picture would contain a record of the apple and this apple would be of quite a dense shade of gray. On this same picture area, however, the leaves would be reproduced practically clear of any shading. The succeeding picture would carry the outline of the apple, itself, but almost clear of any shading, while the leaves on this particular picture area would be of a very dense shade of gray. Succeeding pictures would be reproduced as the above. First the dense apple with the clear leaves and then the clear apple with the dense leaves. Now in projecting, the machine is equipped with a color filter which makes one whole revolution to two projected pictures. One half of the color filter is a greenish-blue gelatin, the other half is orange-red. In threading the machine the area with the clear apple image is placed so that the red gelatin of the filter is directly between it and the light. Now the apple on this particular picture area being clear, the color from the red-orange filter can pass through it onto the screen but no color can pass through the leaves on the particular picture area because they are too dense to pass through light. Now when the second picture is pulled down to replace the first picture the filter has made a one-half turn and the green-blue gelatin is now between the light and the film and the picture of the apple being dense, it obstructs the light from the filter reaching the screen. But the light can pass through the leaves because they are on this particular picture, clear. Therefore, on the screen we find a combination of color from two picture areas and due to persistence of vision these colors coalesce in the brain and record a reproduction of the complete apple and leaves. The projection used with this process, projects at twice normal speed, since it takes two separate pictures to form one complete color picture.

With the subtractive process, however, the colors are visible on the film, itself, and these results are obtained by various means, such as mordants and dyes, high efficient chemical tones or by the imbibition or transfer process, and white is formed by the absence of complementary colors. Going back to Lee and Turner, their process was, as already mentioned, a three-color additive method. The camera was constructed with a revolving color disc, having three circular bands of colored transparent filters, each adjacent to the other. The inner band was, if I remember correctly, red, the next blue and the last green. The filter was constructed so that only one color showed at a time and the speed of photographing was forty-eight pictures a second. Thus the red segment would take its place between the lens and the film and record its particular colors. The picture would then be pulled down and the blue filter take its place, recording its tones and then that segment would be pulled down and the green would follow recording its colors and then the red filter would come into play again, and so on. A point worth mentioning here is that these negatives were made on the wide width film similar to that used by the old Biograph Company—something like three by two and a half inches in size. From this negative a positive was made and this positive projected through a similar filter to which the film was taken about the speed of forty-eight pictures a second and the results on the screen were worthy of praise.

However, one must look further back than 1902 to learn of the early experiments to obtain color photography. One of the earliest records shows that in 1869, that is 60 years ago, Clerk Maxwell, then of the Royal Institution of London, expounded very definite ideas along this line. Of course, in those days, even ordinary black and white photography was quite difficult, and those who attempted to make pictures had even to mix their own emulsions and coat their own plates before being able to take their negatives. And with this in mind, we can more easily understand and more readily appreciate the difficulties that these early color workers had to contend with. With regard to the attempts by Clerk Maxwell, we find that his results were far from perfect, due to the fact that his negative photographic plates lacked color sensitivity. His negatives were sensitive only to certain colors, particularly the blue end of the spectrum. His plates were not at all sensitive to the red and green regions of the spectrum, and consequently with this great handicap, he was unable to reproduce true natural colors. However, his theories were correct even if his materials were not.

About ten years later, Louis Ducos du Hauron, a learned Frenchman, published a book on the problems and solutions of color photography. Du Hauron explained in this book the results of his experiments, and undoubtedly had a very comprehensive idea of the requirements needed to obtain true color results. It is interesting to note that many of the color processes now on the market, still photography in particular, were either suggested or outlined by du Hauron. One especially that has enjoyed a world-wide reputation is the screen plate process. Du Hauron suggested that the surface of a glass plate might be covered by tiny filters of red, green and blue, and a sensitive emulsion be coated on top of these colored grains and the photo taken, the little filters passing the colors through in their correct order.

About this time Dr. Herman Vogel, of Berlin, made an all important discovery. Referring to Clerk Maxwell's work, I mentioned that his negatives lacked color sensitivity, and consequently his results suffered. Dr. Vogel made the discovery, that certain dyes added to the emulsion prior to photographing made the negative sensitive to reds and greens. The value of this discovery cannot be underestimated, because it forms the basis of all natural color processes, either for still work or for motion pictures.

Following these attempts, we then come to what was undoubtedly the first true photographic reproduction of objects in natural colors. This honor belongs to Frederick E. Ives, of Philadelphia. To obtain his result, Mr. Ives made three negatives of his subject. Each negative was taken through a transparent color filter, or screen and therefore each negative carried color values corresponding to the filters through which they were taken. Positives were then made from these negatives. In order to project these positives, Mr. Ives designed a very ingenious projector which was named the Ives Chromoscope. Into this machine were placed the three positive plates, which were then projected through three filters similar to those used in photographing the negatives, the whole being projected simultaneously and in register onto a screen. We find that the results are reported as being "very beautiful," as they undoubtedly must have been.

Thereafter, many processes appeared on the market, processes that aimed at being simple enough in operation to attract the eye and pocket of the public. The most notable of these is the Lumiere Autochrome, which follows somewhat the idea suggested by du Hauron and already mentioned, that of placing colored particles beneath the emulsion and producing color in that way. This gives beautiful results when in the hands of an expert, and will reproduce most faithfully almost every color.

Another method that gives excellent results is the Paget Process. There are others, but these two are the most noteworthy. There are also dozens more that have gotten no further than the Patent Office and consequently of little interest to date. All of these processes are concerned chiefly with still photography and concern motion pictures only indirectly.

To the best of my memory the Lee-Turner process was never publicly exhibited, the technical difficulties dooming it to absolute failure. However, everything must have a beginning and credit is therefore due to Lee and Turner for their attempt.

During the period that Lee and Turner were working on their process, another method was born, I refer to Kinemacolor. Kinemacolor was the invention of George Albert Smith, of England. Undoubtedly Mr. Smith had seen the results of the Lee-Turner process and realized that the method was too complicated, for he eliminated one color from his experiments and worked with only two colors, they being red and green, and his results, while not as perfect as the three-color method of Lee-Turner, were remarkably good.

It was in 1909, in a small projecting room in Wardour Street, London, that I first saw Kinemacolor. I doubt whether I shall ever forget the incident, because it was something of a thrill in England in those days, to see ordinary black and white "movies," and to see motion pictures in natural color, well, that was something to remember. The subjects were "Harvesting in Sussex," showing scenes of rural England and "Lake Garda," one of the many beauty spots of Italy.

That was twenty years ago and I am not exaggerating when I say that there is nothing on the market today that will give finer and truer color than the best Kinemacolor results. Of course, I am overlooking all technical problems when I say this and am merely referring to the result on the screen when the projection was handled by an expert.

Mr. Smith sold his process to Mr. Charles Urban, an American then in England, and it is due to Mr. Urban's business acumen that the process became so well known throughout the world.

Another contributing factor to this popularity was the death of King Edward and the coronation of the present King. All of these colorful events were recorded by Mr. Urban. There was first the burial of the dead King with the pomp and ceremony attending such an important event. Then there followed the Coronation of King George. London was a blaze of color, as gorgeous processions passed through the streets each day. There were reviews of troops and the fleet. There was the Investiture of the King's eldest son. All these and many more similar picturesque events were recorded in Kinemacolor. And there were command performances by the King to view these natural color pictures at Windsor and Balmoral Castles, which, of course, put the stamp of approval on them, and finally, as a culminating climax, came the most gorgeous of all events, the King's visit to India. I doubt whether any who saw the Indian ceremonies on the screen will ever forget them, especially the "Elephant Parade," as the animals draped in their costly covers of gold and silver, pearls and precious stones, paraded slowly by the camera. All these events had far reaching results in the forming of Kinemacolor companies in foreign countries, but, unfortunately, the success was short-lived because of technical difficulties.

Kinemacolor as already mentioned was a two-color process. In photographing, normal size film was used. Today, we can buy from Eastman Company negative which is called Panchromatic, meaning sensitive to all colors, but in Kinemacolor days only the ordinary black and white film was available and it was therefore necessary to sensitize this film to make it Panchromatic. The camera photographed at thirty-two pictures a second, the color filters being red and green. The pictures were taken alternately, first the red filter took its place behind the lens and passed through on to the film, all colors on the red end of the spectrum, then this picture was pulled down, the color filter revolved half way and the green filter took its place letting through colors of the other end of the spectrum. From the negative a print was made onto ordinary positive film. Prints resembled ordinary black and white film except that they carried latent color values. A special projector was needed to project the prints. This machine projected the films at the speed of thirty-two pictures a second.

The machine carried a color filter of red and green gelatine. The film was threaded in the projector with the picture photographed through the red filter opposite the red gelatine of the projecting filter.

Many readers of this article will remember seeing Kinemacolor and if so, will recall the eye strain and frontal headaches that accompanied the viewing of these pictures.

The reason for these annoyances was that there was no visible selective color on the screen and the effect of objects being in their natural color was produced solely by persistance of vision.

Consider, then, the tremendous strain that the eyes were put to while watching such a picture, for say, an hour. Experiments proved that the softer the colors, the less strain to the eyes and consequently the more pleasing the results upon the screen.

This policy was adopted eventually by the producers of Kinemacolor but rather too late. In all fairness one must admire Charles Urban for his great undertaking, both here and abroad and mention that the public showings of his process served to expedite many experimenters to paint the screen green and red. At the same time that Kinemacolor was being exploited there appeared the Gaumont three-color process. In this method ordinary size film was used, but the pictures, instead of having four perforations to the picture, that is, of course, four each side, had but three. In photographing, the camera recorded the images through three lenses simultaneously, each picture being taken through a color filter. So, therefore, instead of having to take at a high rate of speed like Kinemacolor, the normal speed of sixteen pictures a second was the order. This was a great advantage, because of added exposure. From the negative, ordinary black and white prints were made. The projector, like the camera, had three lenses, each lense having a color filter similar to those used in photographing, and the positive was threaded in the machine with the red picture opposite the red filter and so on. The result on the screen was excellent, but it required the constant attention of the operator to keep the images in register. The process was never a success and recent attempts to revive it seem to have met with failure.

During this time it was apparent that what was required was a film which carried visible color actually incorporated in the film itself and one that would run on any standard projector at normal speed and with this in view, an Englishman, Donnisthorpe, by name, carried on experiments and did actually obtain such a result but his process was extremely complicated and little has ever been heard of it.

After the failure of Kinemacolor in this country, extensive experiments were carried on at the Company's studios at Long Island, under the direction of Wm. Fox, of England. Fox had seen the result of Donnisthorpe's experiment and realized that such a process was possible, but that it would have to be much simpler than Donnisthorpe's if it was to be considered at all practical. Remarkable results were eventually achieved by Mr. Fox, but for some reason he left the company, and the task of completing experiments passed on to Mr. Waddingham, but little of the results has, as yet, reached the market.

After the Kinemacolor activities came to an end, the Prizma, Inc., of Jersey City, was formed. The technical problems of the new Company were in the hands of Charles Raleigh and William V. D. Kelley. Raleigh was a graduate of Kinemacolor and it is natural, I suppose, that his tendencies should be toward the process that he knew so well and so the basic principle of the original Prizma process was practically the same as Kinemacolor, but with this difference, that instead of using the special projector they made use of an attachment, carrying the red and green color filters, which could be attached to either the Powers or Simplex machines. A further improvement was in the photographing and projecting filters whereby the colors on the screen were very soft and quite pleasing to view. The results thus obtained were far superior to Kinemacolor, but it was generally realized that it was but a question of time before even this improved method would be in the discard, especially since Fox had proved that quite good results could be made by the subtractive method, i.e., visible selective color in the film. Raleigh didn't stay with the company long. Apparently he, like Charles Urban, could see no further than the additive method. Kelley was more progressive, and with the capable assistants, made quick progress. His first step forward was the method known as the "alternate dye" method. A means of obtaining color result without the aid of attachments to the projector. The idea was not new, it having been previously tried by an English Company, who called their product Bio-Color. This was in the days of Kinemacolor and, if my memory serves me correctly, Charles Urban put a stop to their activities on the grounds of infringement of his process. The "alternate dye" method was applicable to either Kinemacolor or Prizma prints. The positives, instead of being projected through color filters, were dyed red and green, that is, the picture carrying the latent red color values, were colored red, likewise, the pictures carrying the green values, were colored green. This was, in reality, transferring the colors of the projection filter onto the film itself. The advantage of this method was that the film could be projected from any standard projector without attachments, by merely running the machine twice as fast as normal. The difficulty of the process was, applying the colors evenly to their respective areas. Remember that the film was colored alternately red and green throughout its entire length. The first attempt, which was very crude and costly, was by applying coverings to all of the red pictures on lengths of fifty feet, which meant applying four hundred of these coverings by hand. The film was then immersed into the green dye bath, washed and dried. The coverings of course, protected the red pictures from the green dye. The green pictures were then protected in the same manner, and the red areas, having been uncovered, were then subjected to the red dye bath, washed and dried and the operation was complete. This method was quickly abandoned for obvious reasons.

Thereafter, various schemes were tried until an extremely simple method was perfected. By this arrangement, the positives were immersed completely in the green dye, washed and dried. The films thus treated, were then taken in any lengths and run through a machine which sprayed a thin coating of water-proofing onto the green picture only, after which the films were immersed in running water which quickly removed the green dye from the unprotected areas. The film was then placed in the red dye bath, the dye affecting only the red pictures, of course. While Prizma was exploiting this alternate dye method, a new process appeared on the market called Technicolor. As with Kinemacolor, a special projector was needed. Their first exhibition in New York City, at the Museum of Natural History, showed a very pleasing result. Their process was a two-color one and their negatives were of a similar nature to both Prizma's and Kinemacolor's. Prints from the negatives were black and white in appearance. Their projector had two lenses—one above the other and back of each lens was a color filter, one red and the other green. The principle of this arrangement was that the pair of pictures, that is the red and green pairs, were on the screen at exactly the same time and therefore the annoying color flicker and eye strain so apparent in Kinemacolor was entirely eliminated. So far, so good. But there was one serious drawback. Deviating for a moment and going back to Prizma, we find that the late Dr. Nichols, of Yale, carried out extensive experiments with a projector having two lenses, his idea being to obtain a result like that of Technicolor's. The result of Dr. Nichols' work was that such a method could hardly, if ever, be a success, due to shrinkage of the positive film. In order to illustrate this point, let us follow the action of the Technicolor projector. The operator has threaded up the machine with the red picture back of the red lens and the green picture back of the green lens and the projector is started. At the commencement, the pictures on the screen may not be exactly in register, but the operator quickly corrects it by a slight adjustment of either lens and with that condition existing the result on the screen is both fine and pleasing. But suddenly there comes a join in the film and a change of scene and the chances are a hundred to one that there is a different shrinkage to the previous scene and if that is the case, the images will no longer be in register, but there will be two images slightly off-set, one in red, and one in green. Of course this condition will stay but a few seconds or until the operator has adjusted the lenses and brought the images into register again. And so another process is put in the discard. Technically, it was far better than either Kinemacolor, or Prizma, but practically, it was worse.

The alternate dye method adopted by Prizma was but a stepping stone along the way. Mr. Kelley, who now had complete charge of all the technical problems of the company, realized this and proceeded without delay to put all the energies of his department to work on the subtractive method, and shortly thereafter produced very fine results. Mr. Kelley employed a positive film having a coating of emulsion on both sides of the celluloid base.

Color records were made by an ingenious color camera and these negative records printed on this a double-coated film, mordanted and dyed with acid dyes. With this film, Prizma were able to forget their troubles, since the film could be projected from any standard machine without changes of any sort to the machine.

Amongst the admirers of the new Prizma process was Miss Mae Murray and her director, Robert Leonard, who were the first to use this new process in dramatic productions. Thereafter, many other producers followed suit. D. W. Griffith, Hugo Ballin, Famous Players Company, etc. Commodore Stuart Blackton, of England, produced a seven-reel picture by this process entitled "The Glorious Adventure," featuring Lady Diana Manners and Victor McLaglan. The failure of this Company, after several years of activity, I put down, largely to the fact of the poor location of the laboratory in Jersey City. It was anything but an ideal place for the production of color work. Had they moved to the coast as they once planned to, they would undoubtedly have held a very prominent place in the industry today. During the Prizma era, other processes were heard of. Eastman, of Rochester, was perfecting "Kodachrome;" Brewster, of New York, was working on a process known as "Colura," and still another process was being perfected known as "Color Craft." News from England brought word of Gorsky's process and the Hamburger process, but to date little has been heard of these. All of these ideas followed the lines of the Prizma process

inasmuch as prints are made on double-coated positive film, but each varies in itself by the method of coloring the images. More recently English papers report new companies being formed over there for the production of color. As the writer has not seen any of the work made by these companies, no report can be made of them. As to the future of color, we can only surmise. Some time ago I received a communication from England to the effect that a new wonderful continuous projecting machine was being exhibited in London. It occurred to me, after studing the drawings of the machine and reading a report of its capabilities, that here possibly was a machine which would project additive pictures without pulsation, at a speed, say, of thirty-six to forty pictures a second. I discussed this with Mr. Charles Urban, of Kinemacolor fame, who had a machine brought over and Kinemacolor prints projected from it, but although the images faded one into the other, the amount of pulsation was almost as great as with the old-time Kinemacolor projector. When a speed of sixty pictures per second was attained, pulsation was entirely eliminated. But, of course, this was impractical.

During the time that Prizma was functioning, Technicolor transferred activities from their special projecting scheme to a subtractive process. Their color record negatives were made and these were printed onto two separate strips of positive film, which, in turn, were cemented together and the process of developing and coloring carried out. Much fine work has been done by this company with this process.

The Technicolor, as now used, is different from the one described above and is known as the imbibition process. By this scheme, separate positives are made from the original negative. That is, one strip of film carries all of the red records, another all of the green records. These films are then mordanted and saturated with dyes corresponding to the colors represented on the two strips of film. These are then brought into contact with a clear film, which is a celluloid base with a gelatinous coating, and the colors are transferred singly from the two dyed films. In discussing this process with Frederick Ives some time ago, I asked whether he thought imbibition would ever be successful for motion picture work and he seemed rather dubious about its success, because, as he explained, there would always be a lack of sharpness, due to the colors bleeding or diffusing on the film, itself. However, from what I have seen of Technicolor's recent work, this difficulty seems to have been overcome.

Today, professional color activities seem to evolve around the work of but two processes. Namely, Technicolor and Multicolor. Multicolor's present film is a double-coated subtraction film, and although the Company still is quite young, its results are receiving marked attention in the industry. Colors are faithfully recorded, although, brilliant colors, particularly glaring reds, are purposely recorded in softer hues. The positive film carrying latent color values is subjected to certain chemical treatments which transpose the latent values into their respective colors. Extreme sharpness of the images is afforded by this treatment, giving a particularly well defined result, and great depth to the picture. A contributing factor to the success of Multicolor is their ability to photograph interiors with but little more light than is needed for monochrome photography.

The point that is worth mentioning as being the utmost importance to pictures as made today is the fact that with the Multicolor process, sound can be recorded from the film itself. With the voice, or music or sound effects, the result on the screen is identical with black and white. The sound is an integral part of the film, itself, is colored and is protected with a transparent coating which prevents abrasions and scratches to the sound track, as well as the picture itself.

In conclusion one can only say that if the progress of the future continues at the same speed as it has in the last twenty or thirty years, one cannot foresee any great changes over the present means as used today.

Brulatour-Eastman Technical Service Laboratory

J. E. Brulatour, Inc., is completing construction on a class A building at 6706 Santa Monica Boulevard, Hollywood, which will be occupied by the West Coast technical service staff of the Motion Picture Division of the Eastman Kodak Company.

The feature of this newest progressive gesture by the Eastman people, which is of vital interest to the cinematographer, is the research laboratory which offers many interesting and potentially profitable features.

This laboratory will at all times be under the supervision of men trained in the Research Department at Kodak Park, Rochester.

Approximately $35,000 has been spent in mechanical and scientific equipment with many new developments pertaining to conjunctive photography in sound production.

Research engineers in the service of Eastman Kodak Company have inaugurated their educational campaign on the West Coast, and it has been the privilege of many cameramen to hear the addresses made by these scientists at recent meetings of the Academy of Motion Picture Arts and Sciences and kindred picture organizations.

An outstanding departure in film service is offered in the private theatre adjoining the new Research Service building. This theatre will be equipped for sound projection on the popular processes and will have comfortable seating accommodations for fifty.

The theatre is being equipped under the supervision of sound engineers from the East, and is expected to be a revelation in small-room sound picture projection, it having been especially constructed for this purpose.

The throw from projection machine to screen will be seventy-two feet; the ceiling is twenty-two feet and the width of the auditorium twenty-five feet.

This theatre, the research laboratory and the research library will be available at all times day and night by appointment to all accredited technicians and executives in the industry without charge or obligation of any character.

During the past ten years many picture organizations recognizing the vital necessity for such an institution as this have made many attempts to put over just such a project, but it has remained for the Eastman Kodak Company, the pioneers in every progressive photographic step in the industry, to take the lead which will undoubtedly be welcomed and unqualifiedly approved by technicians and executives in every branch of the business.

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Stolen Love, F. B. O.	Ted Pahle
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Romance of the Underworld, Fox	Conrad Wells
The Last Warning, Universal	Hal Mohr
A Single Man, M-G-M	Andre Barlatier
Orphan of the Sage, F. B. O.	Nick Musuraca
Naughty Baby, First National	Ernest Haller

(*Continued on Page 27*)

Educational Films

Past, Present and Future of Educational Motion Pictures—Lecture Delivered Before the Academy of Motion Picture Arts & Sciences

By EDWARD MAYER

Ex-Secretary Department of Visual Education, U. of C. Extension Division.

Education is the imparting and acquisition of knowledge. We gain knowledge and become educated by experience and we gain these through the senses. An old adage says: "Seeing is believing," but our mind does not retain all that we see, although a large portion of our knowledge comes through the sense of sight. The eye sees only what the mind comprehends. The senses of taste, touch, smell and hearing are connected with the brain through an elaborate nervous system, but that of sight is connected directly with the brain through the eye. This is one reason why the eye is the most retentive of the human sense organs.

With many of the lower animals other senses are predominant, the sense of smell in some, hearing in others, but in man sight is ascendant among his faculties. While oral methods may have been first used by man in the transference of ideas, it is certain from the scientific findings that have been made that visual images were used in the dim ages of antiquity to convey information. We are learning today from the drawings and paintings discovered in ancient caves in France and Spain the types of animals familiar to men of Paleolithic times.

Some of the earliest records are picture records and it was the purpose of these records to inform, to educate. However, as mankind advanced so did his method of picture writing. This may be illustrated by the hieroglyphics of the ancient Egyptians. The ancient Egyptians have left their history to posterity in these hieroglyphics carved upon their ancient monuments, tombs and palaces. These told in picture form their conquests, their current events, mode of living and so on. The Chinese characters or writing of today is an evolution of picture writing. Other races have expressed their thoughts in temples, as those that may be found in India, Java, Siam and other countries of the Orient. In certain sections of the western hemisphere, notably in Mexico, Peru and Bolivia, may be found traces of pictured history of a race of people that have passed into the Great Beyond. The Toltecs, and succeeding them the Aztecs, have left monumental evidences of their art in the Temple of the Sun and the Temple of the Moon, near Mexico City. The American Indian also used pictures as his mode of writing. In fact, there is hardly a large race of people that have inhabited this globe in the past who have not used some form of pictures to express themselves. There are some exceptions, however, such as the Aborigines of Central Australia, who are living relics of the Stone Age, and the remote tribes of Pigmies that may be found scattered in New Guinea, the Philippines and certain sections of Africa.

Man in his process of advancement made rapid strides in the art of visualizing his thoughts, but it was with the advent of the printing press that he made the most rapid advances. It may be said with authority that the printed picture was not used for educational purposes until the year 1657, when John Amos Comenius, a German educator and philosopher, gave the world the first practical illustrated text-book—the "Orbis Pictus," or the World Illustrated. This book, however, was not the first illustrated book. Comenius believed that the child could not learn through words alone. He therefore appealed to the eye and the mind of the pupil through the skill of the artist. Pestalozzi and Rousseau, representing the naturalist school in the latter part of the Seventeenth Century and early part of the Eighteenth Century, taught that the child should learn life by living, and preached a "return to nature." Froebel, who put Pestalozzi's theories into practice, believed in developing the sense of sight and touch, and employed visual aids in his famous kindergarten. To Comenius, however, belongs the distinction of introducing visual education to the modern world. He may properly be called the "Father of Visual Education."

Man made another advance with the advent of photography. Out of the photograph quickly grew the stereoscope and the lantern slide, and all three have found a prominent and lasting place in the field of education. Then came a new form of illustration, ushered in with the twentieth century, the motion picture. It combines the principles of the photograph and the lantern slide with the earlier arts of drawing, and has added to them life. It is apparent that visual aids are fully as old as education itself. The picture has grown steadily as an aid in teaching, from the time when earliest man carved his first crude drawing in stone until the art of photography and cheap reproduction made pictures available to all.

It is not necessary to go into the details of the early history of the motion picture, but possibly you may be interested to know that the idea is not as recent as some would have us think, for as long ago as 65 B. C. Lucretius in his "Rerum Natura" wrote of "images that appear to move," and Ptolemy, the Greek Philosopher, wrote a series of books on optics, about 130 A. D., in which he spoke of persistence of vision and described a simple apparatus by means of which the phenomenon might be observed. It is the existence of this phenomenon that has made possible the development of th motion picture.

Possibly most of you are familiar with the experiments made by Dr. Edward Muybridge in 1872, at Palo Alto, when he endeavored to secure a moving photographic record of a horse in motion. This was the first attempt to make an educational motion picture. Dr. Muybridge did succeed in photographing a series of pictures and perfected a machine which was handicapped with the terrifying name of "Zoopraxoscope". With this he succeeded in projecting a "moving" picture on the screen, thus enabling a number of persons to watch the results simultaneously.

Following Muybridge came Dr. E. J. Marey, who in 1882 invented a "photographic gun", the first camera capable of taking through a single lens a number of exposures per second requisite for recreating the illusion of motion when projected. Then came Edison, Eastman, Jenkins and others. Muybridge and Marey devoted all of their knowledge and experiments solely to the attainment and demonstration of scientific facts and some of Dr. Marey's early motion pictures have as much scientific interest today as when they were first made. One of these early pictures was made to discover how the flight of one insect differs from another. Others showed the scientific world the locomotion of amphibians in water—the jellyfish, eel, skate, seahorse and starfish. These pictures were limited to a small group of scientists, but today the entire world may see them. In another experiment, made about 1896, Dr. Marey succeeded in photographing the successive phases of heart action in the tortoise under conditions of artificial circulation and was thus able to study the mechanism of cardiac pulsation. Incidentally, a print of this very picture, about four hundred feet in length, was used by the late Dr. d'Ancona of San Francisco in the schools of that city up to two years ago. The educational value of that film will never complete its run. Another pioneer scientific investigator who carved a niche for himself in the Hall of the Immortals is M. J. Carvallo, of France, who as sub-director and secretary of the Marey Institute, was probably the first to apply the X-ray to motion photography. He succeeded as early as 1900 in producing pictures in motion showing the process of digestion in the stomach

of a frog. Dr. J. Comandon, also of the Marey Institute, was one of the first to popularize the educational film, for it was about this time that the well-known firm of Pathe Freres made its appearance and under its auspices Comandon did much of his work. If you will recall, the majority of the early releases of that company were educational. These early scientists employed the cinema only in research work and original investigations and but few of the films they recorded were ever given to the public, as their contents appealed to only a limited few. The public of today, however, is interested in scientific films, especially if accompanied by a lecture or explanatory matter.

The use of the motion picture for entertainment was a later development. It remained for American energy and initiative to discover the entertainment value of the film and develop it into such an important industry.

All of these early experiments and accomplishments in Europe were in the cause of education and instruction.

Although in the United States most attention has been devoted to the development of the motion picture for the profitable field of entertainment, their value for education, with which Muybridge and Marey first endowed them, has never been lost sight of. Our government was among the first to utilize motion pictures on an extended scale for instruction, producing in 1906, and exhibiting at the Jamestown Exposition in 1907, a number of pictures covering the work of the U. S. Reclamation Service. Since that time the Department of Agriculture has developed a large number of films and maintains a production laboratory in Washington, D. C.

Comparatively few motion pictures have been produced in this country under the supervision of educators for school use. The majority of the so-called educational films are pictures originally produced for the theatrical field and re-edited for educational purposes. There is one economic reason for this and it is one of great sufficiency. There is no profit in the production of educational motion pictures for what we term the non-theatrical field. In the past ten years that I have been connected with the field of visual education a large number of companies have been organized for the production of teaching films. Where are they today? There is only one in existence and it has gone into the production of advertising films, film slides and other by-products pertaining to visual education.

The cost of producing educational motion pictures depends, of course, upon the subject matter. Geographical pictures are the cheapest to produce and scientific the most expensive, particularly those of a biological nature, in which it is necessary to use the retarded motion process and microscopic subjects. The most expensive factor is the time.

One of the most remarkable contributions that have been made in recent years are those of Mr. Arthur C. Pillsbury, who attempted to photograph a fractured bone in the process of knitting. The specimen used was a rat and it was necessary to make exposures to the X-rays of two minutes and twenty seconds duration at intervals of twenty minutes each. The result was that the rat received severe X-ray burns which retarded the healing of the fracture. However, this is but a beginning and this field of photography has a brilliant future. Special film used by Mr. Pillsbury measured 3¼ inches by 4 inches per frame, but by reconstructing his camera the regular 35 mm film will be used in the future. He has also made pictures covering the germination of cells, the nucleus and many other scientific subjects. The cost of producing such pictures is relatively much higher than other scientific pictures and there is little financial return for the producer other than from lectures. It is regretable that these pictures have no commercial value so that more scientific investigations could be carried on.

I have stated that there is no profit in educational motion pictures. This may best be explained by the following example. A company produces a series of one-reel pictures on nature study. I select that classification for the reason that there is more demand for this type of film than any other. It furnishes prints to a distributing unit such as those maintained by the universities for distribution in their respective territories. During the school year, nine and a half months, a print may receive a maximum of sixty bookings, at a maximum rental of $1.50 per

(*Continued on Page 22*)

Our A. S. C. Outposts

[For many months Jack Smith, A.S.C. has been in Asia shooting for the most part in Siam and Cambodia. He is accompanied by Mrs. Smith who is a great help to him in many ways and who acts as his secretary when it comes to writing to the folks back home here. Jack had hoped to get some good shots of the recent coronation of the new king of Cambodia, but lack of lighting equipment made the trip of no avail. He is now working on a big wild animal picture in the jungles of Siam and will be absent three years. The letter herewith presented was written by Mrs. Smith from Bangkok, capital of Siam.—Editor's Note.]

Jack asked me to send you some stills, which are going forward today under separate cover. Among them are photographs of some of the Wats or temples here—the Buddha is of solid gold leaf and the Wats are practically all of beautifully colored porcelain tiles in all shapes and sizes. It is just an example of what can be used for backgrounds in pictures here. Our only regret is that we are unable to photograph it all in color. One of the stills shows the three characters we are using in the forthcoming production. In another Jack and our entire group with a troupe of the Roya! Siamese dancers we were using one day and which the King of Siam has consented to send to the United States if wanted for publicity or prologue work in connection with the picture.

Their costumes are very beautiful, usually made of heavy brocades or gold and silver cloth and in order to have them fit perfectly are sewed on them just before the performance. They are studded with various colored stones—their very best costumes for gala ceremonies containing precious stones. The girl's head-dress is of solid silver and how she kept it on her head while dancing was more than we could figure out, for it was very heavy.

The two native costumes are prevalent here. The men of the upper classes wear white coats with oddly arranged skirts, usually of a heavy blue silk, which are draped like short, baggy trousers. The "sarong," also a sort of skirt, is the general costume both here and Java. In fact many of the sarongs worn here are imported from Java and are of their beautifully colored batiks. The American and English women use them, too—but they sew them up across the bottom and put them around their legs at night to keep the mosquitoes off!

We are moving north on Sunday, December 16th, and expect to be gone until the latter part of March. Sid Lund, the laboratory man, will be here, as we have a fully equipped laboratory working now and we will send our stuff down as we finish. Our address will remain the same. Jack heard last week they were arranging for a wild elephant hunt so went on up ahead to see about it and wired today for us to follow.

There are only two trains a week up there, but when they run them, they run real trains. Each first-class compartment contains very comfortable leather upholstered seats, electric lights, polished nickel wash basin and an honest-to-goodness thermos bottle hanging in each room. The meals are very good. Siamese food is all very delicious anyway. They have so many ways of cooking in fresh cocoanut milk and so many new kinds of fruits we aren't accustomed to that we don't miss the great American dish of "ham and eggs" at all.

We will be spending most of our time in the jungle so our first week up there will contain a lot of target practice for all of us. After that I expect to carry a gun in one hand and the script in the other.

The Siamese people are a very friendly, contented lot and all very anxious to co-operate in every way. Of course, not being able to talk their language handicaps us some, but there are so many well educated Siamese who speak English very well that we had very little disastrous trouble so far and trust we can continue the same way.

Jack's trip to Cambodia to photograph the coronation was not very successful, due to the heavy rains they had all through the days of the ceremony, and what wasn't done outside was done in the throne hall which was very beautiful, he said, but also very dark. So he got very little film and no stills worth sending.

As for the cool weather you are wishing him—there just isn't any of that over here. These last few weeks we have been having cool evenings and nights which have been more than welcome.

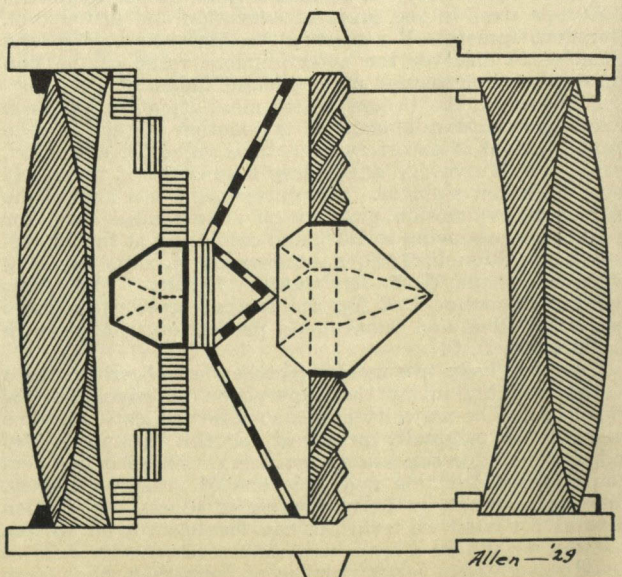
Just as soon as we get into the work so we will have some stills that will be well worth while we shall send them on, together with descriptions of a few days' work.

Trick Lens Developed

The cinematographer has always been limited in the selection of his lenses, especially those with which he could make trick or multi-image photographs. Two well-known Germans have designed such a lens, and after many experiments and great labor have devised a new trick lens, which should satisfy all demands for this special field.

Dr. Vester and Professor Syl announce in a recent issue of the FILM-KURIER, a German technical magazine, that the lens is a combination of different refractive materials; from these and reflecting prisms most remarkable distortions are secured. In addition to the prisms of ordinary glass they have used green, yellow and platenized glass, together with mirrors in the internal construction of this remarkable lens. It is needless to say that the resulting photographic images will be of a most unique type.

The accompanying illustration shows the placement of the distorting prisms and reflecting mirrors in the central part of a standard photographic lens. As yet we have secured no data as to the market price of this special lens, but it is reported that the price will be somewhat higher than the standard cine lenses.

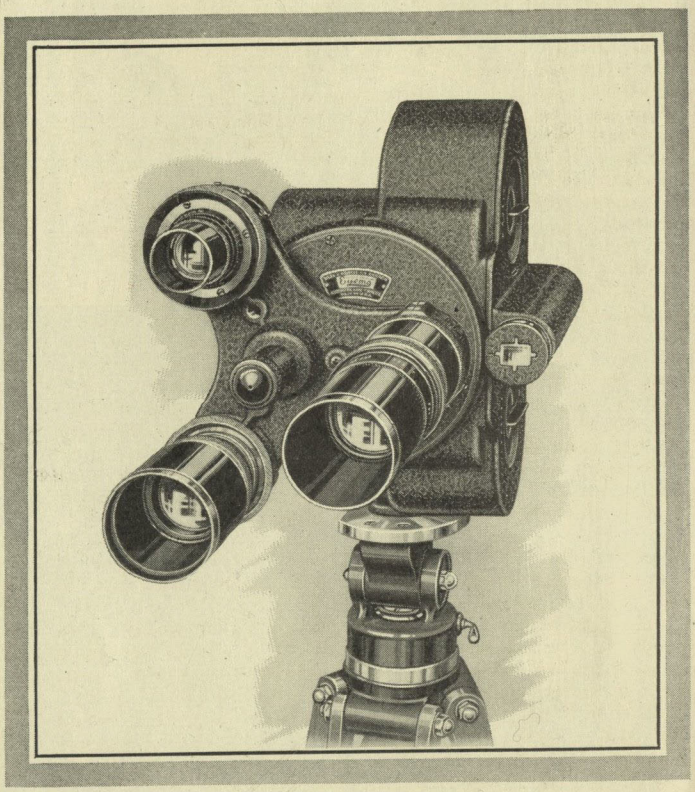


The New Multi-Trick Lens of Dr. Vester and Prof. Syl.

Upper Left—Promenade in the grounds of one of the great temples in Siam. Upper Right—Types of players used in Mr. Smith's production—Mr. Smith at work—A Siamese boy. Center—A gigantic statue of the Buddha made of solid gold leaf. Left—The peculiar skirt-like trousers affected by the Siamese men of the upper classes. Lower Left—Mr. and Mrs. Jack Smith and their company of Royal Siamese Dancers. Lower Right—a group of "Wats" or temples, in Siam, built of brilliantly hued tiles of artistic design. The architects of these temples were past masters.

NOW! *Turret Head FLEXIBILITY*

for Bell & Howell *Eyemo*



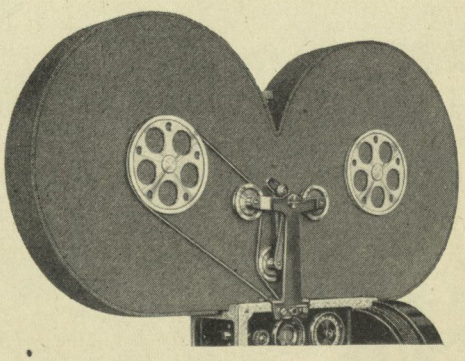
Bell & Howell now announces for the Eyemo Movie Camera a new 3-lens Turret Head of super-fine quality that adds even greater adaptability to this light-weight, precise, automatic, hand-held favorite.

Any three Eyemo lenses may be mounted on this turret. The swing from one lens to another is but the matter of a split second. Thus to Eyemo is given a flexibility, accuracy and precision, making it in its own field quite comparable to Bell & Howell studio cameras. The turret is built with the meticulous care characteristic of all Bell & Howell products.

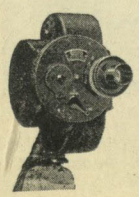
With new Eyemo Cameras, the Turret Head can be supplied ready installed. Old cameras for which this equipment is desired must be sent to the Bell & Howell factory for installation.

Special carrying cases are available. They are designed to carry Eyemo with lenses mounted and ready for instant service. Write to day for *further details.*

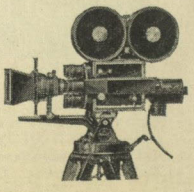
New Bell & Howell 1000 ft. Soundproof magazine with Silent Belt Tightener



A very popular element in "talking movie" production is the Bell & Howell soundproof magazine shown above. Consultations on standard cameras and silent equipment for sound recording purposes are invited.



BELL & HOWELL CO.



Dept. C, 1805 Larchmont Ave., Chicago, Illinois

New York, 11 W. 42nd St. **Hollywood, 6324 Santa Monica Blvd.**

London (B. & H. Co., Ltd.) 320 Regent St.

Established 1907

Silencing the Bell & Howell Camera for Sound Work

The necessity of eliminating all extraneous noises in sound recording cinematographic work is self-evident, since noises, the source of which are not clearly seen on the screen, are extremely disturbing as they distract the attention of the audience from the sounds or pictorial effects proper to the story which is told upon the screen.

It is obvious that the elimination of such extraneous noises is much more important when the picture and accompanying sound are recorded on the stage than when they are recorded on out-door locations. A double reason may be ascribed for this: first, when recording in the out-doors, the effect of reverberation of sound, except in exceptional cases, is almost totally eliminated, and secondly, it is quite logical to suppose that extraneous, but not unnatural, noises would be less disturbing in out-door locations than in any interior.

The chirping of a bird in a pastoral scene, for example, might add effectiveness to the sound record, even though the bird is not actually seen. But if we should show, for instance, the interior of a room and hear a bird singing, even though it would be logical to suppose that a caged bird could be singing in some part of the room out of the range of the camera, it, nevertheless, would overtax the imagination of an audience, which would attempt to locate where the bird might be instead of paying particular attention to the all-important action of the scene.

It is quite obvious that noises which are extraneous to the scene and unnatural will result so disturbingly as to entirely destroy the pleasantness of the sound and of the photographic effects which are an intrinsic part of the picture record.

In sound picture productions, the elimination of noises produced from outside sources, such as those produced by normal traffic within or outside the studio lot, has been brought about by the erection of sound-proof stages.

It remained to eliminate all extraneous noises within the stage, which can be divided into three distinct classes:

First: Extraneous noises—such as voices other than those to be recorded, hammering, shuffling of feet, and the like, the elimination of which is dictated by simple common sense.

Second: Acoustical noises—the noises registered by the microphone, due to reverberation of sound, which are controlled by properly damping the stage and set.

Third: Mechanical noises—the noises produced by the operating of the mechanical equipment used in the recording of pictures, mainly the lighting equipment and the motion picture camera.

Fourth: Recording equipment noises. These noises need not be taken into consideration, because the sound recording equipment is now registered at a distance from the microphone and almost always outside of the stages, in a room especially equipped for this purpose.

The extreme sensitiveness of the microphone has forced the cinematographer to enclose himself and his cameras in a sound-proof booth having a special window cut in one of the walls. In this opening is securely fastened a thick plate of optical glass, through which the photographic record is taken.

To emphasize the sensitivity of the microphone and the necessity of a complete elimination of even the noises which are the less detected by the ear, it may be stated that for a booth glass window 24″x30″ it was necessary to make use of a glass plate one-quarter inch thick, because glass plates of lesser thickness would be set to unduly vibrate by any disturbance from within or without the booth and the microphone would "pick-up" such vibrations, which were finally reproduced as very disturbing grating and hissing noises.

The use of the camera booth brought forth considerable comment and criticism. Besides the limitations thrust upon the cinematographer by the necessarily limited space in which he is forced to perform his exacting duties, the use of a camera booth also limits to an objectionable extent the **mobility of the camera.** This series of limitations add considerably to the problems of the cinematographer and are a serious handicap to the freedom of action which is essential for obtaining the fine photographic results which are required and which have characterized the modern motion picture productions.

These considerations made it evident from the very beginning of the talking picture that the elimination of the camera booth was not only desirable but a vital necessity for the success of this revolutionary system of picture presentation.

It was also evident that the camera booth could not be dispensed with if the mechanical noises inherent in the functioning of the motion picture camera were not sufficiently eliminated, so as to permit the placing of this apparatus at a reasonable nearness to the microphone without incurring the danger of registering those noises, which would immediately mar the quality of the sound record.

Since the very creation of the Bell & Howell camera, the engineers of this company have endeavored to reduce to a minimum the unnecessary noises peculiar to its functioning.

For the past five years especially, the Bell & Howell standard cinematographic camera has been undergoing improvements along the lines of noise elimination, so that at the time when more exact requirements were demanded by the advent of talking pictures, the Bell & Howell engineers were prepared to meet the demand and it required but an incredibly short time for them to supply a camera so equipped that it is ideal for photographing motion pictures in conjunction with sound and voice recording.

* * *

The most audible noises of the standard camera were due to the clicking of the spring belt used to unwind the film in the take-up section of the magazine, the clicking noises of the intermittent shuttle movement, the noise peculiar to the enmeshing of the rather complicated trains of gears and the peculiar noises produced by the ball bearings distributed all over the camera.

Previous to the advent of the talking pictures, the camera was devised and constructed so as to insure the greatest possible running smoothness and the most easy and efficient accessibility and working condition of all of its parts, which were designed with a reasonable disregard of the noises they would produce.

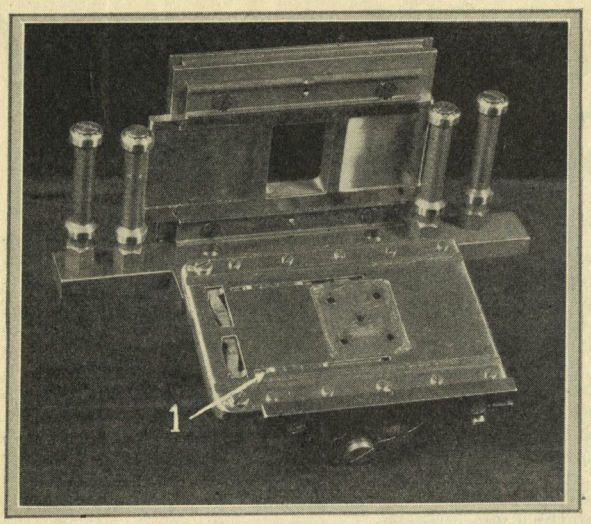
Furthermore, some of the noises which were practically inaudible when the camera was operated at the normal speed of sixteen pictures per second became quite disturbing when the exigencies of sound recording necessitated the increase of the recording speed up to twenty-four pictures per second.

Previous to the advent of sound pictures, the Bell & Howell engineers had devised an extremely efficient ultra-speed mechanism which, after a few minor alterations, proved to be ideal for sound recording work.

Improvements in this mechanism consisted mainly in the substitution of formica (fibre) for steel gears and in the setting of the film tension at from one and a half to two ounces. This eliminated the noise formerly produced by the pawls clearing the film perforations as they passed back for a new hold on the film.

Multicolor

Multicolor has just completed a two-reel subject for Sennett, President John W. Boyle, of the A. S. C., directing the photography. The Multicolor is winning enthusiastic endorsement from production men who have come in contact with it.



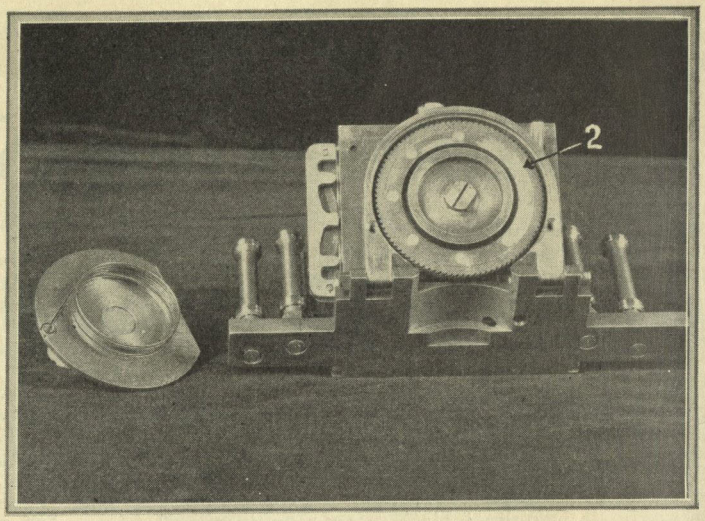


FIGURE 1 and 1a.
Bell & Howell check pawl Super-Speed movement.
Figure 1. 1 Driving finger; Figure 1a. 2 Formica (fibre gear)

The problems involved in the rewinding of the exposed film in the take-up section of the magazine were happily solved from the early days of cinematography by the use of a spring belt sufficiently taut so as to permit an easy winding of the film and sufficiently loose to avoid an excessive tension and to compensate for the reduction in speed of the driving axle of the magazine with the increase in size of the roll of film.

The belt was effectively performing its work by skipping and sliding over the magazine pulley whenever the tension was becoming too great.

The noises produced by the action of the belt, as well as those produced by the belt joint every time it hit or left the magazine pulley, were to be completely eliminated and after much study and experimentation, an endless fabric belt was adopted, together with a new belt-tightener arrangement which automatically secures the proper tension and uniform take-up of the exposed film regardless of the size of the roll that is being wound.

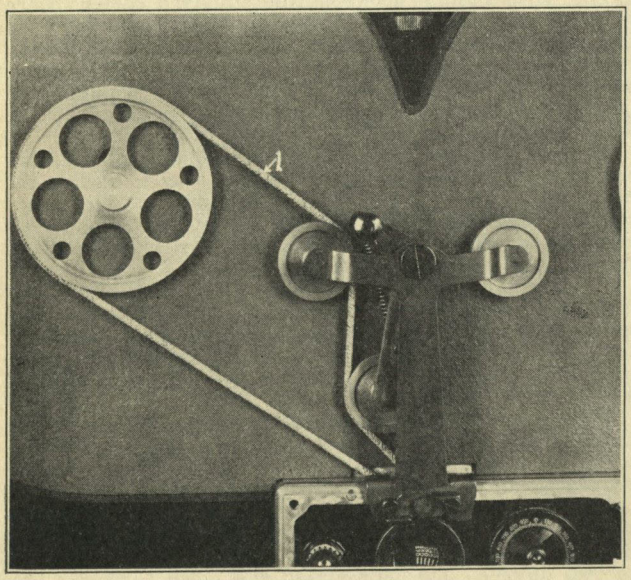


FIGURE 2
Bell & Howell Belt Tightener and 1,000-foot magazine.

This tightener arrangement is provided with special bearings which entirely eliminate any possibility of noise and also present the useful feature that it permits the use of either the 1000-foot or the 400-foot magazine at will.

The careful investigation conducted in order to ascertain the cause of undesirable noises brought forth the fact that the film magazines themselves were producing a drumming effect, due to their shape and hollowness.

The back and cover of the 1000-foot magazine are, therefore, drilled with numerous holes, which are so located that they interrupt the sound waves and thus reduce the above mentioned drumming noises. To further insure the silencing of the magazines they have been covered with a thick layer of spongy rubber and have been equipped with especially designed rollers and hubs which are made with painstaking care and accuracy and which are absolutely free from the noises previously inherent to these units.

All other parts of the camera have been subjected to the same precise investigation, and steel gears have been replaced by formica (fibre) gears whenever necessary; ball bearings have been replaced with solid bronze bearings, and all clearances and tolerances have been reduced to the minimum—thus eliminating any slight loss in motion and disposing of other sources of noises.

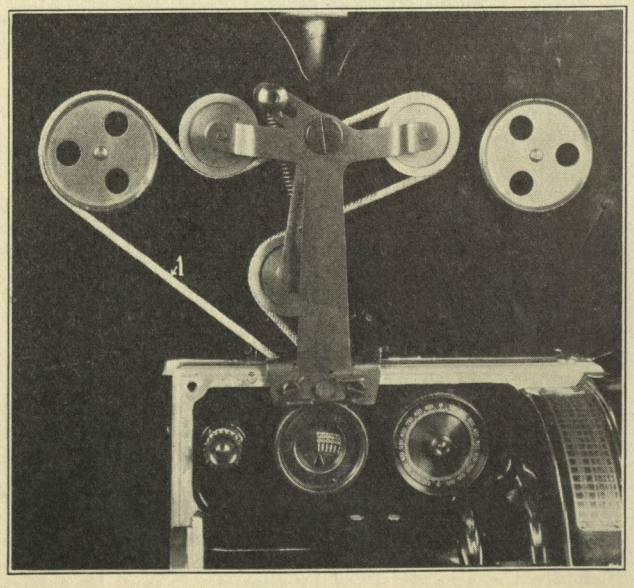
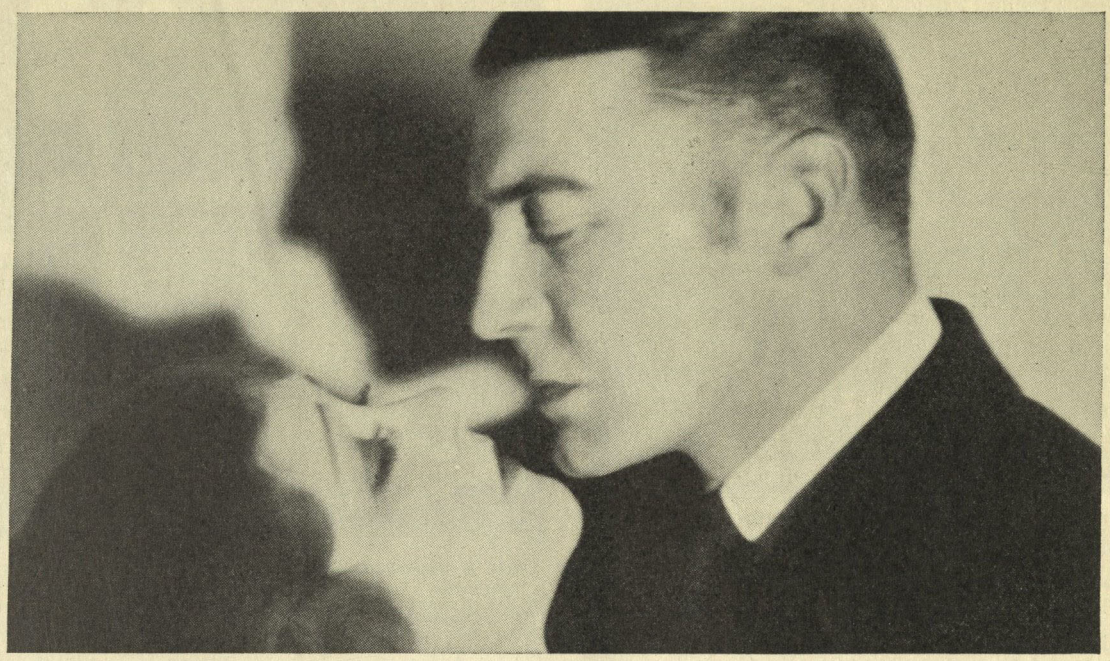


FIGURE 2a
Bell & Howell Belt Tightener and 400-foot magazine.
1. Fabric endless belt.

These last changes have reduced somewhat the ease with which the standard camera was operating. This difference has nevertheless no influence whatever on the good functioning of the apparatus and does not cause any complication in operating it, since all cameras used for sound work are of necessity motor driven.

The solid bronze bearings have been designed and are



Clive Brook and Irene Rich, starring in "The Perfect Crime," an F B O feature, directed by Bert Glennon

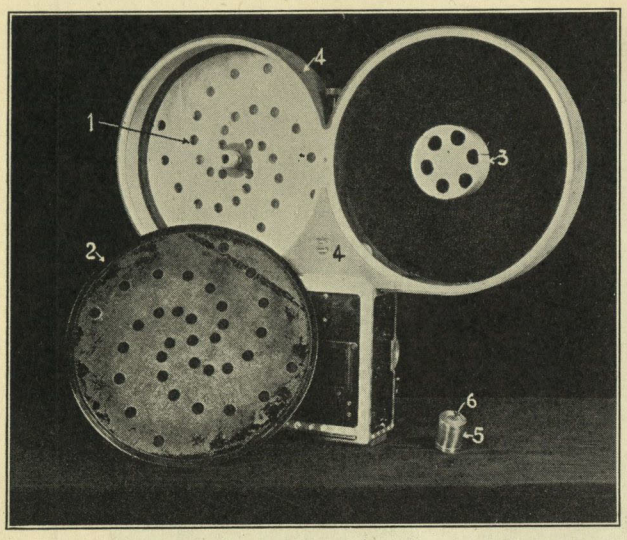


FIGURE 3
Bell & Howell 1,000-foot magazine adapted for sound work. 1. Holes drilled in back of magazine; 2. Magazine cover from which the rubber cover has been removed; 3. 3-inch spool; 4. Rubber outer-cover; 5. Film roller; 6. Oil-less bearing of film roller.

made with the utmost care so as to insure their proper functioning, and they do not require any more than the normal care demanded by any precision mechanical apparatus.

To further insure the complete suppression and damp-

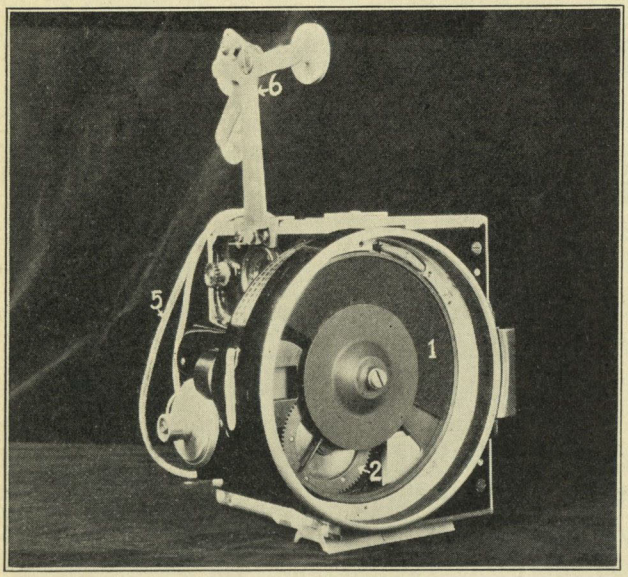
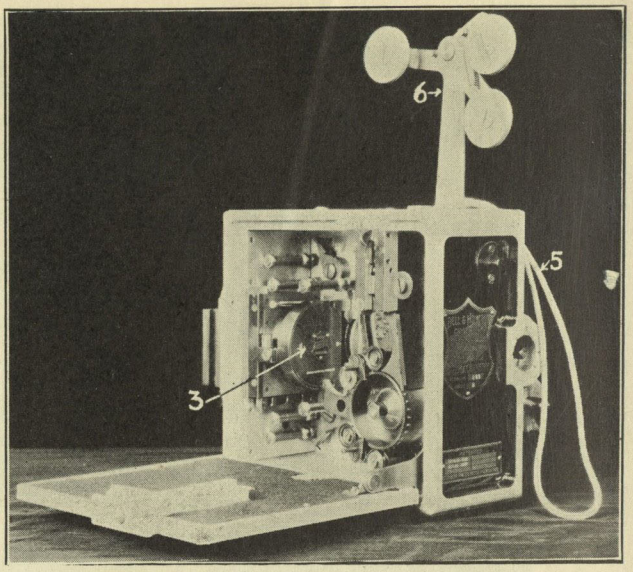


FIGURE 4
Front view of Bell & Howell Camera equipped for sound with turret and plate removed



Bell & Howell Camera, equipped for sound, showing speed movement. 1. Felt lining of the camera shutter; 2. Formica (fibre) gear; 3. Check pawl superspeed movement; 4. Felt lining of camera door; 5. Fabric endless belt; 6. Belt tightener.
FIGURE 4a

ening of any residual noises, the interior of the cameras, as well as the shutter blades, are being dampened by lining them with a sound absorbing felt.

Through these and other minor changes, it has been possible for the engineers of the Bell & Howell Company to evolve a camera eminently suitable for work on sound pictures, and actual practice on sound stages has proven that no extraneous camera noises were "picked-up" by the microphone when the camera was placed as close as from eight to ten feet from the subject to be photographed and **without the protection of the justly maligned and cordially detested camera booth.**

Schedule of Lectures

"Appreciation of the Photoplay as an Art Form and a Social Institution"

Beginning February 6th, 1929, at the University of Southern California

(Spring Semester)

FEBRUARY 6

Scope and Purpose of the Course.....Dr. Karl T. Waugh
Dean, College of Liberal Arts

The Photoplay and the University.....Dr. R. B. von KleinSmid
President, University of Southern California

Photoplay Appreciation.....Douglas Fairbanks
President, Academy of Motion Picture Arts and Sciences

FEBRUARY 13

Scientific Foundations.....J. A. Ball

FEBRUARY 20

Early History.....Commodore J. Stuart Blackton

FEBRUARY 27

Growth and Development.....Frank Woods
Secretary, Academy Motion Picture Arts and Sciences

MARCH 6

The Silent Photoplay.....Ernst Lubitsch

MARCH 13

The Photoplay with Sound and Voice.....Benjamin Glaser

MARCH 20

The Modern Photoplay.....Irving Thalberg

APRIL 3

The Story.....Clara Beranger

APRIL 10

The Actor's Art.....Milton Sills
Chairman of the Committee on College Affairs of the Academy

APRIL 17

Pictorial Beauty in the Photoplay.....William Cameron Menzies

APRIL 24

Commercial Requirements.....M. C. Levee

MAY 1

Principles of Criticism.....Edwin Schallert

MAY 8

Social Utility of the Photoplay.....Dr. Karl T. Waugh

MAY 15

The Photoplay and Aesthetic Culture of the World.....Dr. H. Wildon Carr

MAY 22

Control of the Screen.....Dr. Emory S. Bogardus

MAY 29

Future of the Photoplay.....William C. deMille
Vice-president, Academy of Motion Picture Arts and Sciences

Talkie Technic

WILLIAM DE MILLE
Director William C. de Mille Productions, Inc.

The art and craft of the talking motion picture have hardly progressed to the point where an exact discussion of technic is possible. In fact it almost seems at times as if the craft were hindering the art or that the demands of art were preventing development of the craft. Discussion of some sort is none the less necessary for in this new school there is no teacher but experience and very little of that.

Those of us who, suddenly and without warning, have found ourselves struggling to deal with an unknown art form and to create a new technic to meet new and difficult conditions can, at best, merely consider certain fundamental and practical principles and leave it to the future to confirm or correct our first impressions.

At present the main struggle is to perfect a craft upon which the future art may be founded; but so rapid is the growth of popular demand for the new form of entertainment that a supply has to be created under any circumstances: The studios must do the best they can in the emergency and, under the spur of competition, teach one another the "new game."

There is a natural tendency at the beginning to rush to the spoken drama for aid. At first glance the talking picture seems to resemble the stage play more closely than anything else. But it is doubtful if this point of view will last long. The photograph of a stage play is that and nothing more; and will not continue to satisfy a public educated to the fluent movement and great intimacy of the true motion picture. The addition of spoken language to the motion picture will, of necessity, change the story form, but it need not sacrifice those advantages which fifteen years development of the photoplay has achieved. The screen has been a broader canvas than the stage; the stage a more intense and philosophical medium than the screen.

In combining the advantages of both the new art is bound to lose a portion of the advantage of each, but the gain seems greater than the loss.

Various types of pictures will come into being which will vary in accordance with the relative amount of dialogue used in proportion to the amount of "screen action;" and which will go from the closely knit stage-play construction with little "picture action" to the freer and more expansive photoplay construction using a minimum of spoken dialogue. Between these two extremes will lie other forms, such as the musical comedy-form, and the farce-comedy in which the two elements may be nearly equal.

Undoubtedly the tendency at first will be toward the stage form, but it will not be long before the talking picture will demand its own and, as on the silent screen, the best material will be that which is conceived and written for the medium in which it is to be expressed.

The charm of variety in settings and rapid change of locality need not be lost because the story is told in dialogue. Many of Shakespeare's plays change locale from scene to scene as frequently as the average silent motion picture, but the actual amount of dialogue will have to be less in the talking picture until audiences are willing to sit through a performance of three or four hours.

However amusing it may be to theorize on the future development of the "Talkie" the real problem which confronts us in the studios today is the actual production of the thing itself. Directors find themselves forced into new methods of preparation; cinematographers have to work under conditions which make it impossible for them to do their best work. The writer must readjust his construction to new standards of length and, strangely enough, all seem to live in deadly terror of the "sound man" who they think will tell them that everything they particularly want to do is impossible.

The real answer seems to be that directors and writers are not yet familiar with those basic conditions under which they must work in the future. It is not the sound expert who makes the trouble; it is the sound itself.

Modern directors are as dependent upon their "mixers" as they have always been upon their camera-men. If the picture is out of proportion, badly composed, or out of focus, the director is accustomed to make certain changes in order that his scene may be properly lit and photographed. He will soon learn that the photographing of sound is as difficult as the photographing of faces, more so, in fact, since those conditions which influence it are less understood and the whole process is in a much cruder and more experimental stage. The director will soon begin to be sensitive to "tubbiness" and will begin to think in terms of sets which are not natural tunnels acoustically.

In the present state of the art there will have to be a good deal of give-and-take between the director and his mixer. The situation frequently arises in which a perfect recording can only be secured at the expense of dramatic value. It must then be decided whether, at that particular point, perfect recording or perfect action is imperative. But as the director becomes sensitive to sound quality he will work just as hard for perfection of recording as he now does for perfection of photography. And, as the director becomes sound-sensitive so will the mixer become scene-sensitive. Fate and modern science have made partners of two highly trained men, neither of whom has been used to the other's problems. Each is striving to make the product perfect from the standpoint of his own art; but already each is beginning to realize that the other's problem is his problem, and that to solve either at the expense of the other is to work great harm to the picture. Autocracy on the part of either inevitably produces a certain baffled stubbornness on the part of the other; for, up to six months ago, the work of each was completely unknown to the other.

That so much progress in mutual understanding has already taken place is a great tribute to the sanity of two types of men who, at a moment's notice, have been made dependent upon each other.

The problem of the cinematographer is, perhaps, even more difficult: The necessity of lighting various angles simultaneously for both close-ups and long shots can only be met by co-operation on the director's part. The director must contrive to avoid too great a divergence in angle and must figure his shots so that intercutting sound tracks will give opportunity to change lightings. With great care under present conditions, and with the rapidly improving methods now coming into use it is probable that within a very short time photography of motion pictures will regain all the old freedom and beauty which marked it just before the talkies threw several kinds of monkey-wrenches into the machinery of production.

The problem of proper illusion of distance if an even sound level be maintained will soon be solved, if it is not already solved, by varying distances between the actor and the microphone. This, of course, can only apply within fairly narrow limits. In the case of coming from a long shot to a very close one the answer would seem to be separate sound tracks at different levels.

Perhaps the greatest change made necessary by the "Talkie" is in method of preparation. The old catch-as-catch-can method is gone forever. Careful rehearsal in temporary sets laid out to an exact ground plan, with cameras and actors, has proved to be a great help. If each shot can be charted in rehearsal and the picture essentially made before the director takes his company on the sound stage many present difficulties disappear. It is almost impossible for either cast or director to do real creative work on a sound stage. Creative work may be better done in the quiet concentrated atmosphere of the rehearsal stage, and much of the strain of present methods will be removed when the director goes to the sound stage not to create his picture but to record a picture which has already been created, timed and cut before a camera has turned.

Honor Where Due

By HAL HALL

A great picture is to open in a magnificent theatre. For weeks the ballyhoo has been on. Seats have been sold out at five dollars each—and up.

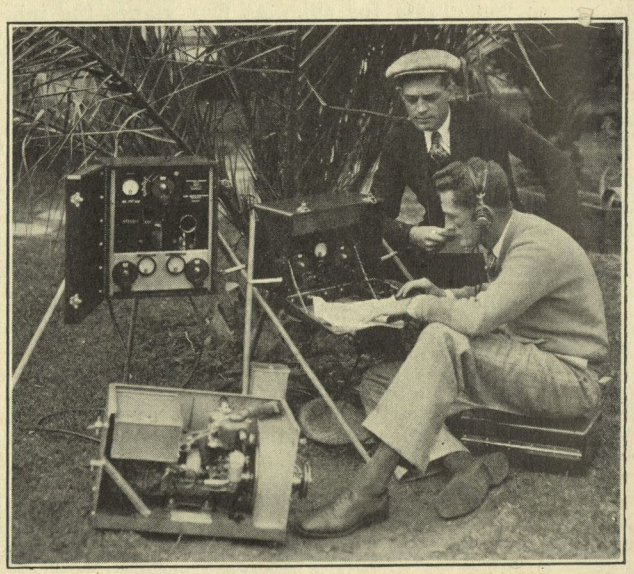
The evening of the opening arrives. Banks of lights are arranged in front of the theatre. Crowds held back by tired policemen are jamming the sidewalks for blocks—all waiting for a peep at the stars who come to look at the picture.

Prologue and other incidentals are over and the picture is flashed upon the screen. The audience gasps and laughs and cries at the proper moments. It is a beautiful picture, acting superb, story excellent, direction brilliant, photography MAGNIFICENT. Some of the shots have brought forth bursts of applause.

And then the personal appearances—the presentation of the star, the leading man or woman, other players and the director.

It is all over. The audience files out talking of the beautiful picture, the wonderful acting, direction and PHOTOGRAPHY.

But there has been one person missing in the personal appearance group. The man who is responsible for the masterly lighting and photography that has made the star more wonderful; the man who has given the picture those wonderful scenic shots, the striking angles. Where is he?



W. S. Van Dyke, Metro-Goldwyn-Mayer director, and Clyde De Vinna, A. S. C., cameraman-radio operator, try out the portable low-wave set they are taking with them into the African wilds where "Trader Horn" is to be filmed. The set, which will reach 14,000 miles, will be their only connection with the outside world, and will be operated by De Vinna, who is an expert radio operator.

Most of the time, if he is not somewhere on location shooting another picture, he may be in the audience. But not on the stage taking his bow. Yet the masterly photography has often made the picture.

That is America and her openings.

But over in England things appear to be different. The cameraman seems to be coming into his own; to be receiving the credit and praise that is his due. They seem to realize that the cameraman is something more than a man who turns a crank when a director gives his command. There the cameraman is being recognized as an artist.

And public recognition is being given him.

As a concrete example, take the case of Clyde De Vinna, A.S.C., who photographed "White Shadows in the South Seas."

That picture opened in London on February 18. They did not have the lights and the vast crowds jamming the sidewalks to view the stars. They had a lot of the bally-

(*Continued on Page 33*)

Inkies on Parade

Universal's Great Set for "Broadway" Affords Opportnity for Biggest All Mazda Installation in History of Motion Picture Lighting

The "Broadway" set, at Universal, has been the center of attraction of the technical film world for several weeks.

It is a wonder in its way for it is the largest and most imposing set ever built for exclusive Mazda lighting.

The key set, at one end of which are grouped four auxiliary sets, is 170 feet long by about 125 feet in width, the entire set with auxiliaries being 220 feet long.

When the travel shots were made, practically the entire set was under light, the total equipment summing up as follows:

Mole-Richardson Equipment

Number of Units	Type	Mazda Lamp Used
189	MR Type 224 24″ Sunspots	5000 Watt G 64
407	MR Type 200 18″ Sunspots	2000 Watt G 48
188	MR Type 211 Rifle Lamps	1500 Watt PS 52
21	MR Type 205 Soft Spots	1500 Watt PS 52
131	MR Type 31 Floor Strips	1500 Watt PS 52
92	MR Type 11 Utility Lamps	1000 Watt T 20
450	Bare Lamps for Starlight Effect	1000 Watt PS 52
1600	Lamps in Stripping at columns and railings	100 Watt A 23
85	Table Lamps	400 Watt T 20

All parts of the set were rigged so that the troupe could rapidly shift without delay—the equipment as rigged gave a connected load of 33,000 amperes. The largest load used while shooting in black and white on super-sensitized stock was 17,000 amperes. When the sequences photographed in Technicolor were taken the load increased to 22,000 amperes.

The set was designed by Mr. Dan Hall, of the Universal staff. Chief Electrician Frank Graves is the wizard responsible for the electrical engineering set-up and, if he never lights another set, this "Broadway" achievement will furnish him with enough laurels for all time.

The difficulties encountered in the installation of the lighting equipment were immense due to the fact that this is an entirely enclosed box set requiring that practically all the light come from above. Only in the case of a very few camera angles was it possible to use lighting from the floor. As all these lights, therefore, had to be installed 50 feet above the floor the job was tremendous and the fire hazard was no small consideration.

This set was a cafe scene of a modernistic design and decoration, gorgeously dressed and elegantly appointed —quite the last word in big set fabrication and **different** all over.

The immensely imposing electrical equipment for the lighting of this entire set and its auxiliaries was the output of the shops of Mole-Richardson, Inc., 941 N. Sycamore Ave., Hollywood, fabricators of the now world-famous "Inkies"—3163 separate units in all.

With the entire load on the effect was amazing and the photographic values as shown upon the screen proclaimed beyond all argument that the Mazda light, properly constructed, skilfully disposed and expertly handled during action, has won a large and permanent place in motion picture production.

On the "Broadway" set perhaps more than anywhere else, it has been demonstrated that the motion picture of the top-notch excellence of pre-sound days can, under Mazda lighting, still be made with sound added in a natural convincing manner and with the additional advantage and economy of speed production.

In all the history of studio lighting nothing has been seen like the "Broadway" scheme of Mazda lighting and if the picture is the commercial success that its present status indicates it is bound to be, this set and its lighting equipment will be established as the criterion of this type of lighting throughout the industry.

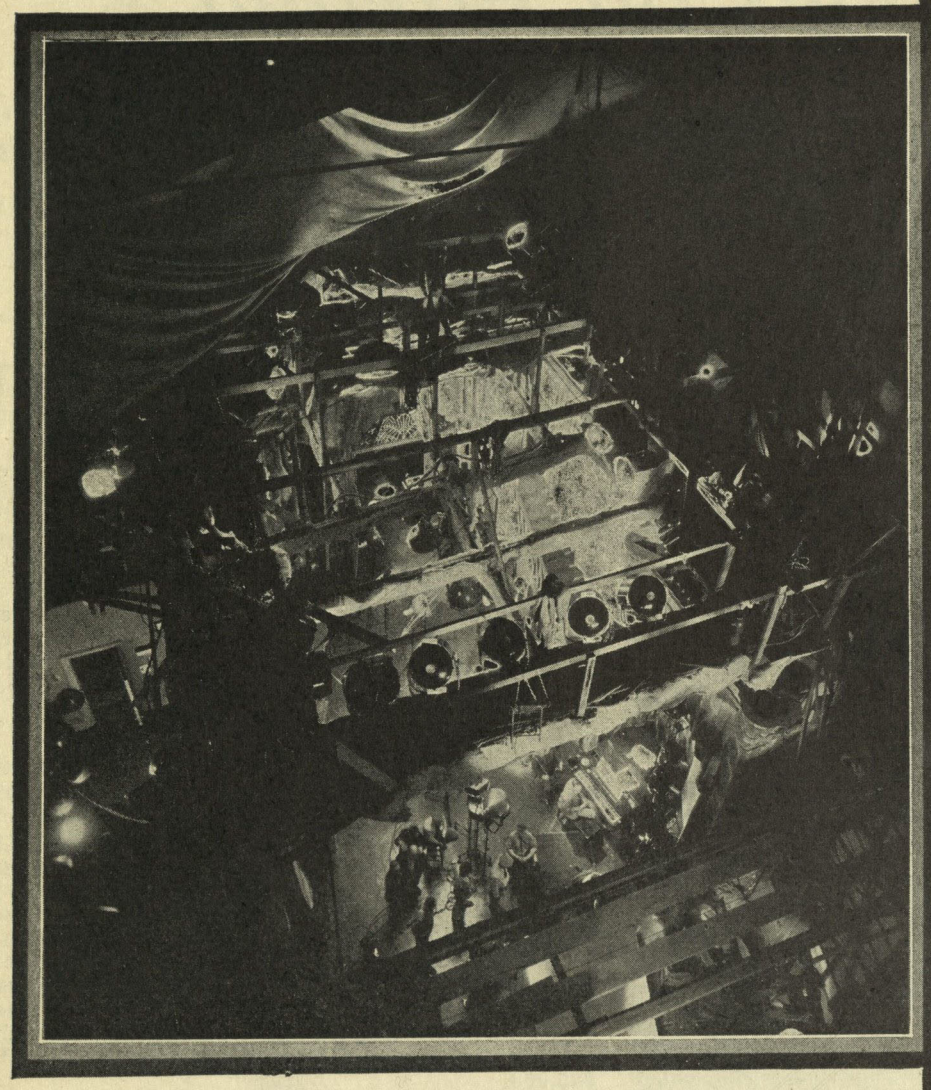
It is regretted that time and space will not admit of a technical survey of the lighting scheme in this issue of **The Cinematographer**, but in a subsequent issue this will be treated. In the meantime the entire industry will do honor to the men to whose foresight, courage and genius the industry is indebted for the marvel that is "Broadway." Carl Laemmle, Jr., producer; Dr. Paul Fejos, director; Hal Mohr, A.S.C., chief cinematographer; Frank Graves, chief electrician and his crew; Mole-Richardson, Inc., manufacturers of the complete lighting equipment; Dan Hall, designer of the set and their aides.

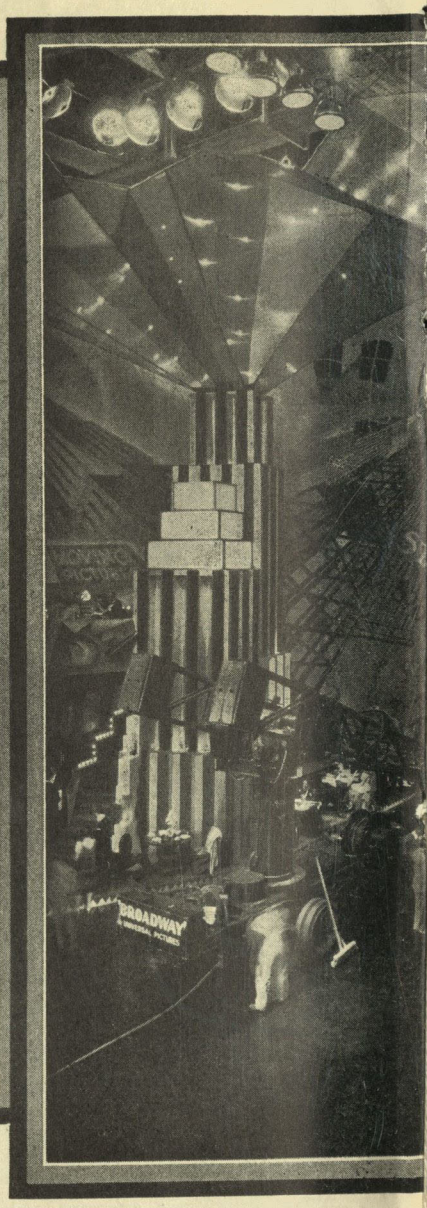
As an adjunct to the "Broadway" set and for the first time in the history of motion picture production, a "Camera Crane," so-called, was used in the shooting of "Broadway." This Camera Crane was the outgrowth of an idea evolved by Dr. Fejos, director of the picture, who, in his study of the "Broadway" theme, came to the conclusion that the story offered unusual opportunities for camera effects of an extraordinary kind. After several conferences with Chief Cinematographer Hal Mohr, Chief Electrician Graves and the Universal Executives all of whom endorsed Dr. Fejos' views, a tentative plan for a crane was submitted to the engineers of the Llewellyn Iron Works, who designed the machine as it is now employed in production, and at a cost of $35,000.

This crane, simply stated, is a counterbalanced steel boom, 50 feet long, mounted upon a carriage, the entire machine weighing 18 tons. It is constructed on the principle of a high speed elevator. This boom is balanced so delicately that it can be swung in any direction, the control being mounted upon a platform attached to one end. The platform will accommodate the camera, cameraman, the director and the engineer who controls the boom under order of the director or cameraman in charge. This platform will carry a load of at least 1000 pounds. With the boom down, the machine will pass through an arch 18 feet high. It is eight feet wide, will make thirty-five miles either on the set or on the open road and runs as silently as a watch.

It carries its own generating unit and its ease of operation is amazing. The effect to one standing on the camera platform when the boom is in motion is like that of floating in space and Chief Cinematographer Hal Mohr describes the photographic effects secured by the crane's tremendous swoops and zooms as nothing short of marvellous and as absolutely unique in motion picture photography.

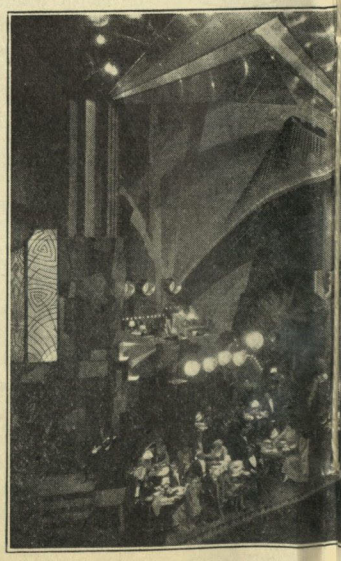
The machine is found to attract universal attention in the production world and no doubt will be widely used after it has been improved and made more plastic. In the meantime it will have made "Broadway" a picture to conjure with.



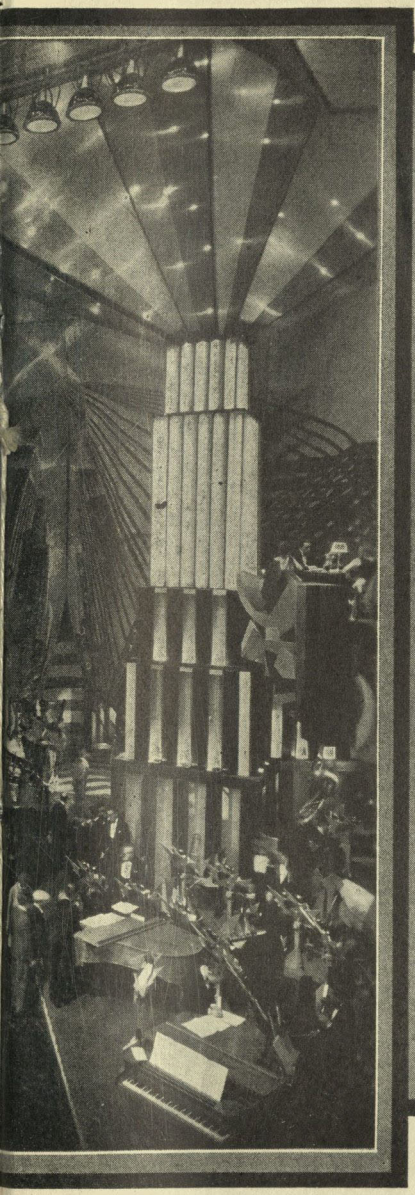


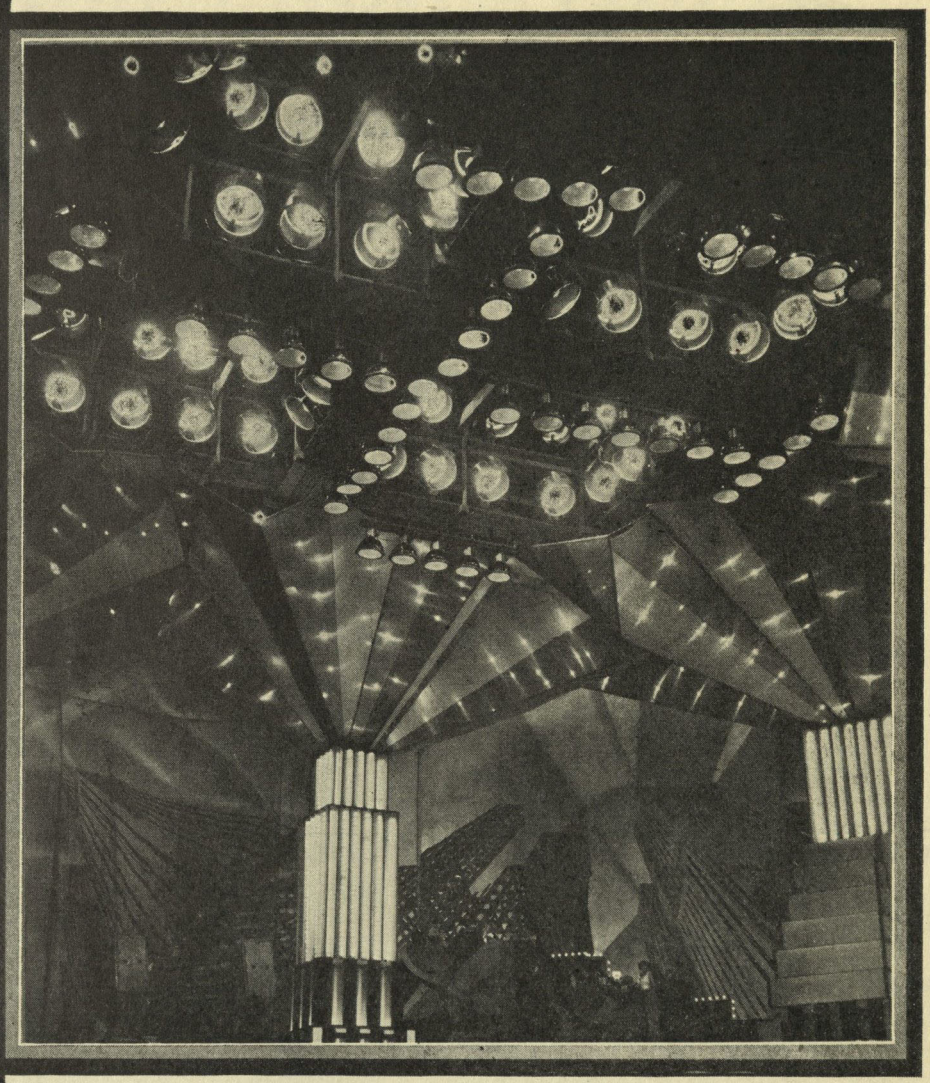
(Above, Left)—A shot from just underneath the roof of the studio down through the upper installation of lights to the floor of the set. This nest of "Inkies" is about midway of the big set and the photograph, though dark, gives a good idea of the manner in which the "acres of diamonds" were installed above.

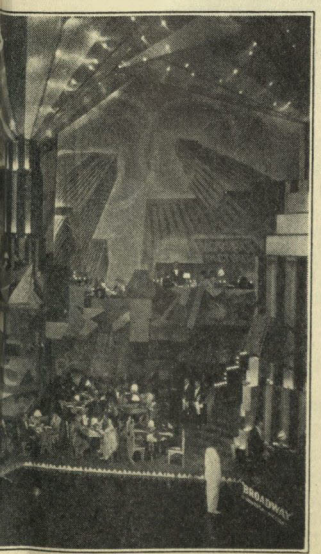
(Above, Center)—This beautiful shot was taken from the floor of the set just a few yards from the center. Note the great camera crane at rest. Chief Cinematographer Hal Mohr (in white) standing upon the camera platform. Note also the details of the set and the ultra modernistic decorations. The starlight effects are caused by Mazda lights shining through thin silk.



(Above Right)—A section of the ceiling lamps as they appeared from floor making a veritable roof of lights all over the set. From the con-







templation of this grill of Sun Spots and Rifle Lamps the observer may gather some slight idea of the marvellous effect of the entire installation with the peak load in full blast. But wonderful, gorgeous, impressive as was the effect of the lights themselves as viewed directly by the people on the set, far more wonderful was their effect as recorded upon the film through the camera's lens—the effect that the public will see. This will make new history in the theatre and will give the partisans of Mazda something at which to "point with pride" for a long time.

(Below, Center)—Here is the "Broadway" set shot from the floor without regard to lighting in order to give an idea of the modernistic decorations and arrangement of the cafe features. Each light shining through the silken ceiling, giving the starlight effect, is a 1000-watt Mazda globe.

Visual Education

(*Continued from Page 9*)

booking, or a total of $90.00. Deducting the cost of distribution, which usually amounts to 35% of the gross rentals, the producer secures a net income on his print of $58.50. You can readily see from these figures what a small return can be obtained by the producer on his initial investment. Should a producing unit make a picture for outright sale he has the possibility at the present time of selling approximately twenty prints. The most he can obtain for a print is 10c per foot. Assuming that he has a thousand foot picture, this means that he can with considerable effort obtain a gross return of $2000. This is certainly not much of an inducement to a producer.

What is true of producing units is also true of distributing units. There is today not one company in the United States distributing educational motion pictures at a profit, although there are scattered over the length and breadth of this country over twenty-three thousand schools, churches, clubs, farm bureaus and other organizations equipped with projection apparatus and using educational films. A company distributing educational motion pictures would have to maintain an expensive exchange with all of its paraphernalia, would have to operate on the same basis as a commercial exchange, and would face the prospect of obtaining the same financial return as the producer previously explained. It is an economic impossibility to distribute educational motion pictures through a commercial organization. Another possible reason for the failure of the distributing units is the fact that they do not understand the non-theatrical field, any more than the usual non-theatrical organization understands the commercial field. What minister or school man is capable of undertaking the commercial distribution of motion pictures to the theatrical field?

The thought has come to you, possibly, where does this vast non-theatrical field obtain its material. Some twenty years ago a few of the state universities maintained distributing centers for slides as a part of their extension service. The purpose of these centers was to distribute sets of stereopticon slides to schools and churches. With the development of motion pictures it was a natural step for these few universities to undertake the distribution of educational motion pictures. The University of Wisconsin, which now maintains the largest non-commercial distributing unit in this country, was one of the original pioneers in this work. It was followed by the Universities of Iowa, Kansas and California, and there are now twenty-one universities carrying on this work. The reason the universities are able to distribute educational motion pictures is the fact that they are supported by their respective states. However, it must be remembered that the distribution of educational motion pictures is an expensive undertaking and it is necessary for each of these distributing units to partially, or in some cases wholly support themselves, therefore a nominal rental is made for their films. This rental is usually based upon the actual cost of the films plus the cost of operation.

Here in California the Department of Visual Instruction is supplying over three hundred organizations each month with educational films and also a few entertainment. The distribution of this Department averages approximately 1,200 motion pictures per month between September 15 and June 15. Little or no distribution is carried on during the summer months, for the reason that the schools are closed during the vacation period and few other organizations use films during the hot season. The following is a statistical record of the Department of Visual Instruction at the University of California for the past ten years:

1918-1919	837	motion pictures
1919-1920	2733	" "
1920-1921	3609	" "
1921-1922	3846	" "
1922-1923	4917	" "
1923-1924	7591	" "
1924-1925	7791	" "

(*Continued on Page 28*)

Motion Photography at High Altitudes

Effects of High Altitudes Upon the Human Body and Mind and the Consequent Reactions Upon Physical Operations of Photography

By J. Noel, *Official Photographer, Mt. Everest Expeditions*

From a paper read before the S. M. P. E. at Lake Placid, N. Y.

Top—The Newman Sinclair camera with automatic electric drive. The main range of the Himalaya Mountains form the distant background.

Below—A long shot at one and one-half miles range of men ascending the ice-cliff of Mr. Everest at 22,500 feet above the sea.

Photographing the Mt. Everest climb certainly lives in my memory as the most difficult task I have ever encountered in open-air naturalistic photography. It was a privilege for me to act as picture historian for this famous expedition and perhaps the following notes from experiences gained may be of interest and utility to other photographers who may undertake motion picture photography at high altitudes.

In order to stress what is a vital factor and one which normally would not be appreciated to its full significance, I wish first to deal with this important physical and psychological aspect of the problem, because unless this is fully considered and plans made to overcome the obstacles it creates—obstacles sufficiently serious to ruin the best made plans with the most perfect camera equip-

ment—then the net result will be that no pictures are made.

Lack of oxygen in the atmosphere at high altitudes causes a retardation of all bodily functions, not only in the power of the muscles but also in the activity of the brain. To illustrate the effect of this upon myself and other members of the expedition, I will briefly describe my experiences in reaching the summit of the great ice cliff of Everest, 23,000 feet above the sea—the highest elevation to which I carried cameras, and the point of observation for my long distance photography of the upper ridges of the mountain.

From the glacier of Everest at 21,000 feet rises a sheer wall of ice as a 1,000 ft. precipice. Two thousand steps had to be cut with our axes and four hundred feet of rope carried up to render the ascent safe for laden porters. The summit ledge of the cliff was an important camera station for long distance pictures of the men on the higher ridges of the mountain. I spent four days and nights at this height but, through the altitude and lack of oxygen in the air causing mountain sickness and mountain lassitude, I found I was incapable of exerting sufficient physical energy and of maintaining mental concentration to operate a camera. Even the simplest camera manipulation became an ordeal. It is impossible for anyone who has not experienced this physical and mental debility of extreme altitude to realize. The only parallel I can quote is the condition of violent sea-sickness and the incapacity that results from that condition.

On first reaching 23,000 feet we were so exhausted we sat around our tents in the snow for some two hours in dazed condition incapable of action. My camera was in my tent. To get it out of its case and shoot a scene was a thing that filled me with dread. I felt overcome by a mental coma. My companions, skilled climbers, felt the same. They sat about for a long time without being able to do anything. Eventually we made some breakfast but performed every action at a ridiculously slow speed. I felt so exhausted that I went to my oxygen breathing apparatus, opened the faucet wide and breathed the gas for 15 minutes. This had a marvelous effect and I quickly became another being. I woke up, took notice and regaining full strength, I was able to commence my work and when my companions started off on their high ascent to 27,000 feet, I was able to manipulate my camera and get long shots of them at one-mile range.

The conclusion of this experience is that artificial breathing of oxygen is necessary for any photographer who contemplates elaborate or intricate work at high altitudes on mountains or in airplanes above, say, 21,000 feet.

Equipment and Camera

Two main considerations govern the selection of cameras for high-altitude mountain photography, portability and freedom from static troubles. My main camera was a Newman Sinclair, 400 ft. capacity, all metal construction. Duralumin is superior to aluminum in its greater strength with equal lightness. The weakness of aluminum is its unsuitability to certain climates and atmospheres. In the camera design it is absolutely essential that—

1. There must be no friction on the film.
2. There must be no velvet pads whatsoever at the light traps of the magazine.
3. No camera should be used unless equipped with automatically opening mouths to the film magazine.
4. Only cameras built for heat insulation of the film from the metal body of the camera should be used. (N.B. Polished duralumin as in the N. S. camera is itself effective in heat insulation.)

At high altitudes, particularly in the tropics, the atmosphere is so intensely dry that static becomes a serious menace and no camera except one incorporating the design detailed above should be used. The apparatus above described is entirely efficient and no trouble with static should ever occur provided the proper care is taken of the film stock.

I found no difficulty whatsoever with static and out of

(*Concluded on Page 26*)

Patents as Related to Photography

By ERNEST L. WALLACE

Of Westall and Wallace, Patent Attorneys
Los Angeles, California

[This paper will be followed by several others along these lines. They will constitute a full and complete exhibit of several patents, like Dawleys, that have caused much speculation among the Cinematographers and technical men of the studios. In the April issue of the AMERICAN CINEMATOGRAPHER *a report on the Dawley patent by Prindle, Wright, Neal and Bean of New York, will be published in full. Facts as to ownership and about personalities interested in the ownership of these patents will be carefully avoided. The entire subject will be treated on its merits —Editor's Note.*

A great deal of interest has been aroused recently among those interested in motion picture photography because of claims made by owners of patents. It is evident from discussions which have taken place that the principles of patent law and their application to the motion picture photography art are misunderstood by many. For that reason a few statements as to these principles will clarify the patent situation.

Ernest L. Wallace

A patent is, in effect, a contract between the patentee and the government whereby the patentee is granted an exclusive right to prohibit others from using the invention recited in the patent. A patent does not carry with it the right to practice all that is disclosed in the patent. It may be that a broad inventive idea disclosed is the subject matter of a prior patent and to practice the later invention would require authorization from the prior patentee. Furthermore, it is possible that the invention recited in the later patent may be usable in a manner not disclosed and which would not infringe a prior patent. It is not the function of the Patent Office to consider infringement. The office only determines whether the invention recited in the claims of the patent are patentable subject matter. For this reason, the issuance of a patent does not guarantee that the practice of the invention disclosed would not infringe another patent. The claims of a patent are definitions of the invention and are not statements of advantages. The word "claim," as used in a patent, originates from the expression, or its equivalent, "What I claim as my invention is:" followed by a statement of the invention.

The patent law provides for the granting of a patent for any new and useful invention of an art, machine, manufacture or composition of matter or any new and useful improvement thereof. It will be noted that there are four classes of invention recognized as being patentable. There may be other inventions which do not fall within these classes and therefore are not patentable. An example is a method of doing business.

The term "art" in the patent laws means a chemical or physical process or method and includes photographic processes. Ordinarily, it does not include a result that is merely the function of an apparatus.

The term "machine" means a combination of mechanical elements, either stationary or movable, adapted to have power applied to them and to transmit such power to effect a useful purpose. Motion picture cameras and projectors are machines.

The term "manufacture" means any instrumentality which does not fall in the other classes. As illustrative of this class, a camera tripod may be cited.

The term "composition of matter" means any homogenous substance made by the industry or art of man and which comprises a combination or mixture of chemical elements. Film, emulsion and the like are included in this class.

The term "improvement" means an addition to or alteration in some existing process or means. However, an improvement need not be better in all respects than the existing means or process. Most inventions are improvements and the patent grant reads that the patentee is granted a patent for "an alleged new and useful improvement in." This does not have the effect of classifying the invention as an improvement but is a formal statement.

There are two kinds of patents, namely, design patents, and patents for inventions in the classes defined above. A design patent relates to an article of manufacture and the product of an artist. It relates to ornamental features and has no bearing on utility. Furniture, medals, automobile bodies and various other articles of manufacture form the subject matter of such design patents. In the present article only the first mentioned classes will be of interest.

Among those having little technical and legal knowledge the term "basic patent" is often misused. The term "basic" is commonly loosely used. The patent laws make no distinction between patents as "basic" or "improvements." The proper use of the term "basic," as applied to patents, is often to define an invention which performs a function never performed by any earlier invention and is broadly claimed so as to include and underly all that later inventors produce. To the beginning of 1929 there have been granted approximately 1,650,000 patents, and among these the following may be classed as basic patents: Morse, Telegraph; Goodyear, Rubber; Howe, Sewing Machine; Edison, Incandescent Lamp; Edison, Phonograph; Bell, Telephone. There are dominating patents and tributary patents. It is not necessary that a patent be basic to control an art. If the patent covers features which are necessary for operation of the invention commercially then it dominates the art and later patents may be issued for improvements. These patents are tributary to the dominating patent and can not be practiced without infringement of the dominating patent, unless authorized by the owners of the dominating patent.

Referring to a specific instance, namely, composite photography, a patent was applied for in 1914 by J. S. Dawley and granted in 1918 covering broadly the process of making motion pictures by effecting photographic images on a negative of a set or scene and in effecting photographic images of action on the negative to produce a composite picture, the images of the set or scene being photographed at such a point in the field or range of the camera as to be relatively small and at the same time to merge with the larger field of action. Dawley described several specific ways of carrying out the invention. The patent law does not require that the patentee describe all. However, he was a pioneer in this work so far as the prior patents disclose. Later improvements and refinements were made and formed the subject matter of patents issued, among others, to Williams in 1918, Hall in 1921, Walker in 1924, and Seitz, Hammers, Dunning, etc. In addition there are patents for processes and machines whereby composite photographs may be made commercially to meet the present day requirements. Dawley's patent is a dominating patent, because he preceded the rest and produced a method which includes and underlies all that the later inventors produced. The later inventors hold tributary patents, and although some are broadly directed to specific methods such as the employment of miniatures, use of mats, silhouettes and means of blocking out to protect image areas, yet they all employ the fundamental idea of Dawley, and there-

fore, to avoid infringement, authorization must be secured to operate under the Dawley patent. The later patentees are in the position that they may prohibit the use of their specific methods, but they themselves are prohibited without authorization from the owners of the Dawley patent from using their own methods.

The question then arises, has Dawley a valid patent? It is a principle of patent law that a patent is presumptively valid, but it is for "an alleged" invention. If it can be proved that the invention was publicly known or used before the invention of the applicant, then the patent is invalid, or if it was publicly known or used by the inventor or any one else more than two years prior to the application for the patent, then the patent is invalid. What does the presumption of validity mean?

It means that the one who attempts to prove invalidity must do so beyond a reasonable doubt. It is not sufficient to produce a photograph which might have been made according to the patent, nor is it sufficient to prove this by pieces which do not combine into a connected whole showing all the steps of the invention were carried out in producing the photograph. Oral statements from the memory of witnesses alone generally are insufficient. Returning to the Dawley patent as an illustration, it would be necessary to prove conclusively that prior to 1914 and probably two years prior to that time the invention claimed by Dawley was practiced publicly, not privately or experimentally. Thus the following evidence would be sufficient: The photograph produced, the film used and other accessories in making the exposure, the development and printing. The witnesses required would be those who had carried out these steps and they would need to be able to connect the same into the series of steps followed. Dates and clear proof of the same, and in such a case documentary proof would be required. Leave out one of these elements of proof and the prior invention or knowledge is not beyond a reasonable doubt. It is now 1929 and the proof would have to relate to events in 1914 or prior to that time. The difficulty experienced in obtaining such proof and in presenting it is obvious.

What are the penalties for infringement? They are not penal. The owners of the patents can recover the profits made by the use of their patented process based on the difference in what it would have cost to produce the picture by any well-known process open to use by any one and the cost by the use of the patented composite picture process. If it would have cost $50,000.00 to build a set and the shot was made and completed by the patented process for $500.00, the recoverable profit would be $49,500.00. To this the court may add treble damages and issue an injunction to prevent further unauthorized practice of the invention.

Sometimes patents are infringed because of ignorance of their scope or of the existence of the patents. Again by reason of an honest difference of opinion, and sometimes willfully. However, it is well for the pocket book not to be careless, indifferent or willful. Every patent should be investigated if it seems to have any bearing on the matter at hand. It is not good business to invest or build up a structure which may be wrecked in patent litigation, or to subject oneself to liability for infringement. This can all be avoided by investigation and competent advice.

Len Roos in British Columbia

Len Roos, A. S. C., incurable globe trotter, stopped in Canada enroute to Hollywood. Mr. Roos started from Australia via New York and is on his way to the Orient again.

Charles Rosher, A. S. C., accompanied by Mrs. Rosher, departed recently for England, where he is to be associated with Director Dupont in the production of pictures at Elstree. The Roshers will visit France, Germany and other countries on the Continent before returning to Hollywood. They will be absent indefinitely.

Motion Photography at High Altitudes

(*Continued from Page 24*)

30,000 feet of film exposed at high altitudes in the dryest atmospheres with this camera equipment, not one foot of the film was static marked.

Tripods and Steadiness

Lenses of extreme focal length will be constantly needed and used, therefore solid tripods with lens supports or platforms are needed. The lens support or platform must be an integral part of the tripod top and reliance must not be placed upon the use of double tripods.

Steadiness in handle turning when the operator is exhausted and breathing heavily at high altitudes may be overcome, as on Mt. Everest, by using an electrically motor-driven camera. The N. S. camera being of very light construction but very serviceable and strong, is driven easily by a 6-volt motor weighing one and one-half pounds and 4,000 feet of film can be exposed by the energy of one 10 lb. weight Edison alkaline storage battery.

Motor-Driven Hand Motion Picture Cameras

At high altitudes where direct photography without dissolving shutter and studio effect attachments is required the most suitable camera will be one of the new tripodless hand cameras, like the Bell and Howell Eyemo, which is spring-motor operated. The new N. S. Auto-Kline camera of duralumin with 200 ft. magazines with ready self-threading film loops and motor capacity to drive 150 feet of film at one winding of the motor enormously facilitates high mountain and aerial photography.

Transportation of Camera

The guiding considerations in designing special carrying cases for high altitude work are—

1. Quick accessibility to the apparatus and rapidity in getting the camera into action.
2. Weather-proof and temperature-proof method of transporting the camera on a man's back.

On the expedition to Mt. Everest Norwegian back-carrier steel tubular frames, with shoulder straps and hip straps, were used. This system keeps the load away from the spine and balances its weight evenly on the shoulders and hips. It is the best method of carrying weights at high altitudes and over rough and confined trails.

The cameras were packed in weather-proof and heat insulated light steel cases. The interiors of the cases were made to fit the shape of the cameras, and the cameras were carried with all attachments and accessories needed for operation, ready in place. This latter was found to be a vital consideration in time and labor saving.

Film Stock and Its Care

Experiences led to the conclusion that the ordinary rules for the care of film were sufficient and needed no special modifications for high altitude work. Ordinary and panchromatic film stock exposed to temperatures of 40 degrees below zero suffered no ill effects, but exposure to sun's heat and extreme changes of temperature were always carefully avoided.

Light values vary considerably and led to a wide range of exposures. The only satisfactory exposure guide was found to be the constant use of exposure meters working on the principle of directly measuring the actinic value of the light.

The only special experience was that the jolting of the cameras in transportation tended to loosen and perhaps unwind the film spools in the magazine, thereby causing friction marks. This was prevented by fitting special locking devices on the shaft of the film cores.

Back from Tahiti

Daniel B. Clark and George Schneiderman, two prominent members of the A. S. C. who have been several months on a mystery mission in the South Seas for Fox, have returned home with the cinematographic bacon. It is said that they have something extraordinary in the way of a South Seas epic.

Recent Releases of A. S. C. Members

(*Continued from Page 7*)

Beauty and Bullets, Universal.....Joseph Brotherton
The Spieler, Pathe.....Arthur Miller
"The Broadway Melody," M-G-M.....John Arnold
"The Flying Fleet," M-G-M.....Ira Morgan
"True Heaven," Fox.....Conrad Wells
"The Sideshow," Columbia.....Joseph Walker
"Wolves of the City," Universal.....Charles Stumar
"Come and Get It," F. B. O.....Virgil Miller
"Noisy Neighbors," Pathe.....David Abel

The Wizard Speaks

In an exclusive interview with the United Press, on Washington's birthday, Thomas A. Edison expressed himself as being fascinated by colored motion pictures and as particularly interested in Vitacolor, the process originated by Max Dupont, A.S.C., of Hollywood. Said Mr. Edison in speaking of color photography: "The genius who successfully masters the problem will achieve something really great." The A. S. C. is proud to claim Mr. Edison as an honorary member of several years standing.

Change of Classification

By recent order of the Board of Governors of the A. S. C., Mr. Ted Pahle has been classified as First Cinematographer. Mr. Pahle is now in New York working on sound pictures. **The American Cinematographer** congratulates Mr. Pahle upon his advancement.

Visual Education

(*Continued from Page 22*)

1925-1926	8835	Motion Pictures
1926-1927	9236	" "
1927-1928	8583	" "

You will note that with but one exception there was an annual increase in distribution. The distribution for this fiscal year has, so far, exceeded the distribution of the preceding year by fifteen per cent. This annual increase is due to several factors, the most important being that each year additional schools, churches and other organizations equip themselves with projection apparatus. Secondly, new additions are made each year to the film library, and a third and very important reason is the fact that educators are more and more appreciating the value of educational motion pictures. Sixty-five percent of the total motion pictures distributed by this Department are used in the school field, twenty percent by churches and allied organizations, and the balance by clubs of all kinds, farm advisors and farm bureaus, industrial concerns, state institutions, and other miscellaneous organizations. Of the sixty-five percent used by schools, ten percent are used by universities and colleges, forty-seven percent by high schools, thirteen percent by junior high schools and thirty percent by elementary schools. Ninety-four percent of the total films distributed are educational and but six percent entertainment.

All of these Departments of Visual Instruction are conducted on practically the same basis as a commercial exchange. We have our methods of advertising, our bookers, film inspectors, film vaults and all other necessary paraphernalia pertaining to the distribution of motion pictures.

In addition to the State Universities, many of the larger city school systems have established Departments of Visual Instruction. The functions of these departments are to acquire and distribute all types of visual aids, such as slides, stereographs, still films, exhibits, and in some cases motion pictures. Although this audience is particularly interested in motion pictures, it may be of interest to know that the educational motion picture represents but eight percent in the cycle of visual education. Practically every Department of Visual Instruction, whether it is in the city or the state, had its inception through the efforts, faith and perseverance of the individual who organized and carried on the work in the face of tremendous handicaps. One of the most complete and efficient city visual education departments in the United States is located right here in Los Angeles. This department also started in a small way and is today one of the largest in the country. It maintains a film library and its distribution exceeds that of the State University. There is this difference, however, between the city and state departments. The state department, as previously told you, has to earn a certain income to carry on its work, whereas the city department can distribute material at no cost to the consumer. It is therefore possible in a city the size of Los Angeles where there are over two hundred schools equipped with motion picture apparatus, to obtain a greater distribution than a department compelled to make a rental charge. Each visual department, starting in a small way, has carried on its work in the face of many discouragements, and in the face of inadequate appropriations, making it necessary for the executive secretary to be a combined shipping clerk, booking clerk, record clerk and salesman. Like all new innovations in the field of education, it had and still has its critics and skeptics but the path is gradually being cleared to the recognition of the value of teaching film. It is the fascination of creating a worthwhile educational factor that has made it possible for this handful of individuals to persevere in the pioneering of this new field of visual education, and we will reach our reward in seeing visual education take its legitimate place in the school.

It may interest you to know where a Department of Visual Instruction obtains its material. Many of the films are acquired through outright purchase, some are loaned and others by gifts. In the University of California we are allowed the munificent sum of $4000 per annum for the purchase of motion pictures, and frequently drastic cuts are made in our budget.

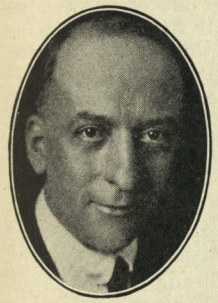
(*Concluded in April Issue*)

The A. B. C. of Sound Pictures

JOSEPH A. DUBRAY, *A.S.C.*

[With this issue of THE AMERICAN CINEMATOGRAPHER *our technical editor, Mr. Joseph Dubray, begins a series of papers on the fundamentals of sound pictures. Mr. Dubray intends this series to be an A.B.C. of the sound picture technique and it will embrace a glossary of words and terms used in this particular form of production. A careful following of these papers should equip the reader with a good working knowledge of this interesting subject.—Editor's Note.]*

The craving that man has had since the most remote antiquity to produce and keep a permanent record of whatever event made an impression upon his imagination has been of late further satisfied by the far-reaching development of sound and talking pictures.



J. A. Dubray

It is the craving of man to keep present before his eyes in some tangible form the reproduction of objects or living things or events which have brought about the slow evolution of all forms of art.

Man's genius has not only brought about the evolution from the crude etching in stone of the dark ages up to the celebrated artistic achievements in marble and on canvas, but it has also dictated to him and made possible the creation and development of the different crafts through which the visual representation of objects and scenes is permanently recorded. Photography is the most complete and perfect of these crafts.

Once the faithful reproduction of scenes was made possible through means which did not require any of the skill particular to a privileged few; once, in other words, the possibility of securing such reproduction became so mechanical that it could be obtained by any one, man strove to make it more and more perfect, to make it represent more and more faithfully the original by adding to the reproduction of form the attributes of **depth,** of **color** and of **movement.**

Cinematography is the most recent and perhaps the most fascinating of the crafts whose mission is to satisfy the human mind through vision.

But another sense, that of hearing, is in human life a complement of vision, almost an essential to life—and here again MAN strove to produce and keep a permanent record of the sounds which aroused his interest.

The phonograph made its appearance and from the crude apparatus which Edison first gave to the world it rapidly evolved into the truly marvelous sound-reproducing apparatus of the present day.

In the beginning the reproduction of the outline of form alone. With the evolution of human intelligence form takes an impression of plasticity, of depth, by the representation of lights and shades. Color follows and alongside of the arts of design and painting, sculpture carves exquisite modelings.

History is told on canvas and in marble and in bronze. And then, the dawn of a new era. MAN brings from nature its secrets, he acquires an understanding of the laws which regulate the life forces of the Universe and harnesses them.

Lightning and thunder lose their terrors. Light and sound become **things** which can be manipulated, can be made to serve man in other ways than to merely permit him to see and hear. Not that this application of nature's forces became possible and an accomplished fact over night as if an invisible door had been suddenly thrown open in front of us. The progress of thought is slow, but on its path ever so often thought leaves some outstanding marks which we call **discoveries** and **inventions** — discoveries and inventions which strike the imagination of mankind as a sudden revelation, but which are nothing more or less than the logical sequence of the accumulation of thoughts.

The making of glass, the discovery of the relative and specific weight, the printing type, the law of gravity, the power of steam, the harnessing of electricity, photography, the serums to combat diseases, the phonograph, the X-rays, cinematography, wireless telegraphy, the aeroplane, radio and hundreds and thousands of other discoveries and inventions which we are pleased to connect with the men who first made them practically applicable to man's needs are, after all, the fruits borne from accumulation of thoughts, fruits of that most wonderful of God's gift to humanity, **intellect.**

And so it is not possible to refer to the sound and talking pictures as the invention of one particular man, but this achievement must be thought of as the most recent and tangible result embodying a remarkable accumulation of thoughts, of discoveries and inventions.

To obtain a thorough and concrete understanding of this modern achievement it is then necessary to retrace the most important steps that led to it.

LIGHT and SOUND, these two impalpable forms of energy have challenged from time almost immemorial man's desire to understand them, to assign to them the causes which produced the effects of vision and hearing, to discover their mode of existence and the reasons for their behavior. Light and sound challenged man's craving of knowledge until the thought dawned that their existence was due to vibrations transmitted from the source of light or sound to the human eye or ear.

There is little doubt that the effect of sound was ascribed to vibrations since a very remote antiquity.

If a flexible metallic band is fastened at one end and if the other end is forcibly bent and then suddenly released it rapidly oscillates to and fro, in other words, it vibrates, and its vibrations gradually diminish in amplitude until the band comes again to rest. During the period of vibration the band produces a clearly audible sound.

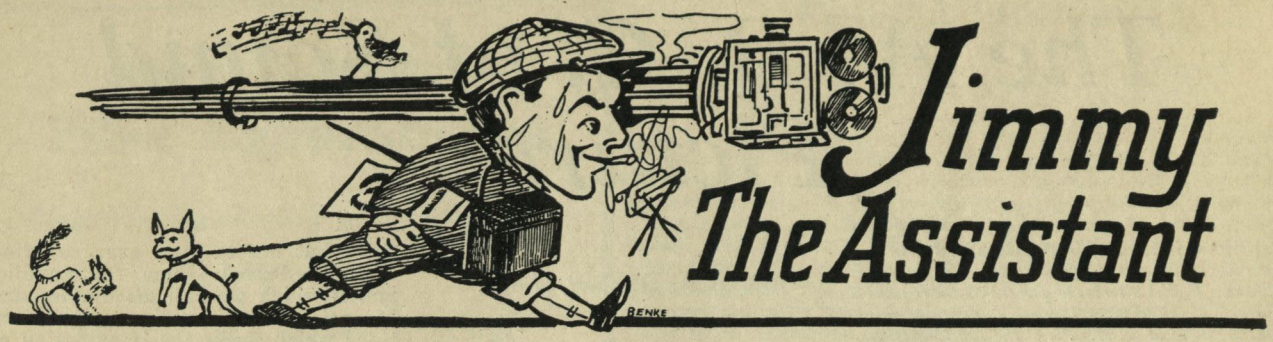
Such or similar experiments could leave no doubt that sound was produced by the vibrating band, that the vibrations were the sole cause of sound, because the phenomenon would cease with the cessation of motion. Furthermore, it was evident that the vibrations of the band were, so to speak, somehow **carried to a distance** so that after being produced they could reach the human ear and produce the effect of hearing. The anatomical structure of the ear validated the theory thus evolved.

Sound can be perceived only if the tympanum, also called the drumhead of the ear, is free to vibrate. It was then logical to deduce that if the vibrations of the metallic band were carried to the ear they would set the tympanum to vibrating in unison with them and, transmitted by the tympanum through the intricate and delicate construction of the ear and a sensitive nerve system to the brain they would produce the effect of hearing.

But the vibrations created by the oscillating band needed a medium to transport them from their source to the ear, a medium, in other words, which would carry them to a distance. It was discovered that air, solids and liquids are the media through which the sound vibrations can be carried, and it was said that these media permitted sound to travel through them.

Once these conclusions were reached the necessity was

(Continued on Page 35)



Jimmy The Assistant

A letter to the Editor:

Gee, Si—I ain't got time, I tellya—I'm busier than a lone flea at a dog show. Lissen here—these articles of mine ain't nothin' much but editorials, no matter how you figger 'em. Now **you're** a Neditor. Writin' them things is your **business.** It's what you're **for.** (Ed. Note: It is **not!**) *

Now here's a idea. You just get parked comfortable somewhere and whittle a pencil nice and sharp and dig into something like this: Write a common sense editorial on Talkies—straight stuff, right from the shoulder. It's about time you put something in the paper about talkies, anyway.** Then change the name to "The American Cinematalkrapher," and you're a cinch.***

All you gotta do to hit the nail right square on the nut is to say "Talkies ain't nothin' but moving pictures with words and music!"—and use about 2000 good plain words to say it.

Make it hot and clear that they ain't plays by photography—or revues on the screen—or exhibitions of voices —or nuthin'—nuthin' at all but good old movies **plus.**

For until that idea gets hammered home the only ones to make any money in the picture game is the manufacturers of red ink.

Who gives a hang about mechanical talk, no matter **how** good it is? The best reproduced talking on earth comes over the radio. And when any one on the radio talks more than 37 seconds—and I don't care if it's Tonsil McAdenoid himself talking from New York—every one in listening distance makes a wild grab for the knob to choke him off.

How many times have you ever seen or heard of a delighted family sitting blissfully around the family radio just drinking in the magic words with which the gifted artist on the air explains the miraculous effects of three doses of Dr. Calbert's Croup Crippler—or demonstrates the thrill one gets from using the new Niagara Fountain pen—or—well, anything? The answer is: never!

They'd rather hear little Himpiquinco Bunk, age 5, play "At Dawning" on a mouthorgan after only two free lessons than hear Abraham Lincoln himself deliver his Gettysburg address.

Slam that into 'em Si! Make it stick! People **hate** talk for talk's sake. Talkies which has sacrificed everything—photography—angles—action—everything to get good voice reproduction is just exactly wrong. Awfully wrong —terribly wrong—for they crowd out what the people like, to make room for something they hate. And right about here, Si, put this thought into careful words. Our technicians is all doing the best they know how—but do they **know** how? Perfect speech ain't necessarily perfect drama. Don't say anything to hurt or discourage 'em, but make clear the thought that the speech is the servant of the story—**always!** The technicians who exert all their skill in makin' everyone talk just exactly like—like—well, like everybody in talkies talks—is probably the most dangerously destructive enemies of the box office in the business. Don't say it quite that tough, Si—but let 'em know that you know it.

And don't let 'em know that **you** know that the "talkie" effect is deliberately produced—that it's the result of carefully planned effort—and that they do it thinking it's perfect voice recording and therefore good.* Shake 'em out of that idea even if you have to bear down pretty tough to do it. Quote 'em Aimee—Bryan—Jim Reed—or any other great speakers you can think of—there wasn't a half-way decent—let alone perfect—voice in the whole raft of 'em.

It's the little human weaknesses—the huskiness—the cracking at great effort—that rings the sympathy bell every time!

That's all technical, of course. Now pump up your nerve and wham at the perducers theirselves. If a picture ain't a good movie it **can't** be a good talkie!

A good movie will pull business in **spite** of bad talk—but a bad movie can't talk its way out of the red no matter if the cast consists of the All American Talking Marathon championship winners for the next fifty years.

Jerk 'em up sharp of the idea that just because they got music and effects and talk they can forget about the old standards of story, cast, mounting, photography, presentation. Them five things will stand as the foundation of picture success just as long as pictures are projected on a screen before an audience.

Just use common sense, Si. That's all that hasn't been tried so far to clear up this mess. Tell 'em to make good movies. The best they know how. Tell 'em to play like they **hadn't** no sound equipment at all and yet **had** to put out pictures that would stand up as silent success against talkie competition. It can be done—don't fret about that —and the people who can do it will be glad to get their old jobs back again, too.

Then—when they've got a good air-tight script ready to shoot—**help** it, if possible, with all the stuff the sound technicians have got. And that's all there is to it. Simple, straight, clear. But too sensible, I think. Sounds radical. Truth usually does.

So, in order to keep from having the whole effect of your argument lost through their just setting you down as a crank, heave in a bunch of the old sure-fire hooey about entertainment, after all, being the ultimate aim and object of entertaining the people who are seeking entertainment. You know what I mean—straddle it like a mattress over a fence—so that the ones who have got a voice, or a song, or a process, or a talkie sketch, or something like that and nothing else, will think you mean that they're what'll save the industry.

Now hop to it. Sorry I didn't have time to do it myself, but mebbe it's for the best. It's a lot easier to tell people how to raise their children than to raise your own.

Yours for busier Editors,
JIMMY.

* 'Tis **So!**—Jimmy. **Sarcazzum **More Sarcazzum
* It ain't—Jimmy.

Our Front Cover

The smashing front cover of the A. S. C. Magazine for March is reminiscent of Ben Hur, M-G-M's great masterpiece. The original shot herewith reproduced was made with a graflex camera, but as the negative could not be procured a new negative had to be made from the graflex print and by this process, of course, some of the values were lost, but not enough to seriously impair the image in the final printing. To Mr. Elmer Dyer, A.S.C., is **The Cinematographer** indebted for the second negative. Note how easily these thoroughbreds are running—not a horse in distress. The cover, as arranged by Artist John C. Hill, will take its place as one of the masterpieces of **The Cinematographer's** series.

The S. M. P. E. in England

Contributed by LESLIE EVELEIGH

Following a visit of Dr. Kenneth Hickman to his native town last fall, a few enthusiasts got together with the result that a London Branch of the Society of Motion Picture Engineers is now in existence and going so strong that it already bids fair to become one of the leading organizations, and certainly the leading technical organization, connected with the industry in England.

The Society was formally inaugurated in October, and on December 17th the first meeting was held at the Faculty of Arts Gallery to elect officers and committees for the first year. Following these elections, our contributor, Leslie Eveleigh, F.R.P.S., was asked to read one of the papers from the Lake Placid convention of the parent Society last September. The paper chosen was "The Sound Motion Picture Situation in Hollywood," by Frank Woods, Secretary of the Academy of Motion Picture Arts and Sciences. Arising out of this paper, Eveleigh was able to tell the Society of various things that were happening over here, among them being the Incandescent tests carried out at Warner Bros. Studios.

Following a meeting of the Papers Committee, a paper was read at the second meeting of the branch on January 28th, by C. F. Elwell, M. I. E. E., technical advisor to British Talking Pictures (which handles in England the de Forest system) on "Cinematography with Synchronized Sound." Following Mr. Elwell's paper was a discussion between various members, prominent among whom were Mr. Whitehouse, of the British Broadcasting Corporation; Mr. Sunde, of the General Electric Company Research Labs.; and Mr. Leslie Eveleigh.

The officers of the London Branch of the S. M. P. E. are as follows:

Chairman, S. Rowson (Chairman Ideal Film Company); Managers: W. Vinten (Chairman Vinten Limited, Apparatus Manufacturers); and Gare Schwartz (of British International Pictures, Elstree); Papers Committee: Arthur Newman (Newman & Gardier and Newman & Sinclair); Jack Smith (Williamson Film Printing Company); Leslie Eveleigh (British Filmcraft and the Bioscope); Claude Friese-Greene (British International Pictures, Elstree); and Alan Williamson (British Screen Productions and Automatic Film Printers). Reciprocal Relations and Membership Committee: Vic Alder, of the Apparatus firm bearing his name; Alfred Hitchcock (Film Director British International Pictures, Elstree); Emil Lauste (Kodak Limited); J. Skittrell (Olympic Kine Laboratories); and F. Watts.

It is intended that the London Branch hold six meetings and two conventions yearly.

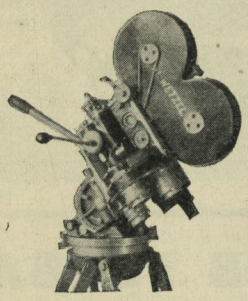
George H. Gibson, laboratory technician, who has been identified in film processing during the past fifteen years, has joined the sales and service staff of J. E. Brulatour, Inc., distributors of Eastman films.

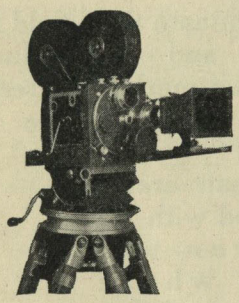
The Akeley Gyro Tripod may be had with either studio legs or news and outdoor legs.

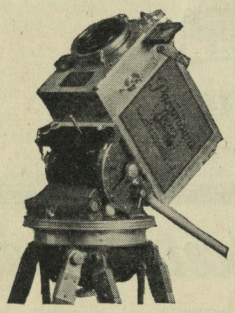
Weight of tripod with studio legs—30 lbs.
Weight of tripod with news legs—24 lbs.

The NEW Universal Gyro Tripod

NOW gives you . . . greater speed, flexibility, and precision with ANY make of camera







The three views above show Bell and Howell, Mitchell, and De Brie Cameras mounted on the Akeley Gyro Tripod. A very clear idea may be gained from these shots of the maximum upward and downward tilt given to the camera by this Tripod.

REALIZING that the principles of the Akeley Gyro mechanism, as embodied in the Akeley Camera, have contributed greatly to the mechanical success of motion pictures, we have placed on the market a tripod in which is contained an improved gyro mechanism adaptable to *any* make of motion picture camera. This Gyro mechanism now gives to any camera advantages until now exclusive with the Akeley Camera.

The new tripod adds to all cameras the flexibility of the Akeley pan and tilt mechanism eliminating the use of crank handles and friction devices which Mr. Akeley found to be unsatisfactory in properly photographing follow shots. There are three different speeds or resistances in the pan, any of which may be selected by the operator. To insure ease of action the Akeley mechanism is entirely ball bearing.

Altogether the Akeley Gyro Mechanism provides for the motion picture photographer a more convenient, a quicker and a more profitable method of taking news or studio pictures. It makes the unusual picture an every-day occurrence, the heretofore impossible shot a simple matter.

Write for our catalogue describing the Akeley Gyro Tripod in full and details of our time payment plan.

AKELEY CAMERA INC.

The Akeley Universal Gyro Tripod

175 Varick Street **New York City**

Honor Where Due

(*Continued from Page 18*)

hoo, yes. But no motion picture camera photographing the players as they entered the theatre.

But what they did have was Clyde DeVinna, cameraman—cinematographer, if you will—making a personal appearance with the opening of that picture. And, after those magnificent South Sea shots had been witnessed by the London Audience, DeVinna, the cameraman, took his bow and accepted the enthusiastic applause of the Londoners who appreciated the art of photography shown therein.

And, why shouldn't the cameraman be given his share of credit? His work is as important as that of the players or the director. If one doesn't think so, just let him gaze upon a poorly photographed picture and decide.

Too long have the cinematographers been hiding their light under a bushel, as it were. Too long have they been considered as mere mechanics or skilled workmen. Too long has the ART of the master cameraman been taken for granted as something that just is.

Cameramen are too modest, too retiring, too shy to speak for themselves. But in this world of pictures and Ballyhoo the motto seems to be:

"He that bloweth not his own horn the same shall not be blowed of man."

Cameramen do many things the public never hears about. Things they do not HAVE to do. But still they do them because most of them are men who place their art before everything else and are happy in the knowledge that they have done a good piece of work—and they let anyone who will step into the limelight and take the bows.

Incidentally, DeVinna is on his way to Africa to photograph "Trader Horn" which Metro-Goldwyn-Mayer is making with Director W. S. Van Dyke at the megaphone.

This little band is going to go far into the jungle and shoot this picture of jungle life. They will be 100 miles from the nearest outpost of civilization surrounded by the dangers of disease and wild animals.

But they will be in daily touch with civilization. They will be in daily touch with their own studio back in Hollywood. They will submit daily reports of their progress and receive news and instructions from the studio.

And it is the cameraman, again, who will be responsible for this. De Vinna is an expert radio operator. He has an amateur station at his Hollywood home. Into the jungles he is taking a portable radio set. It is the same kind as that used by Byrd and Wilkins in the Antarctic. The same as was on the Southern Cross on her epochal flight to Australia.

And with this little portable set DeVinna, each night when his work is done, will get in communication with Hollywood and the folks back home and at the studio, through 14,000 miles of ether.

If things go wrong he will flash the word. He will be the connecting link between the little band of adventurers and the outside world.

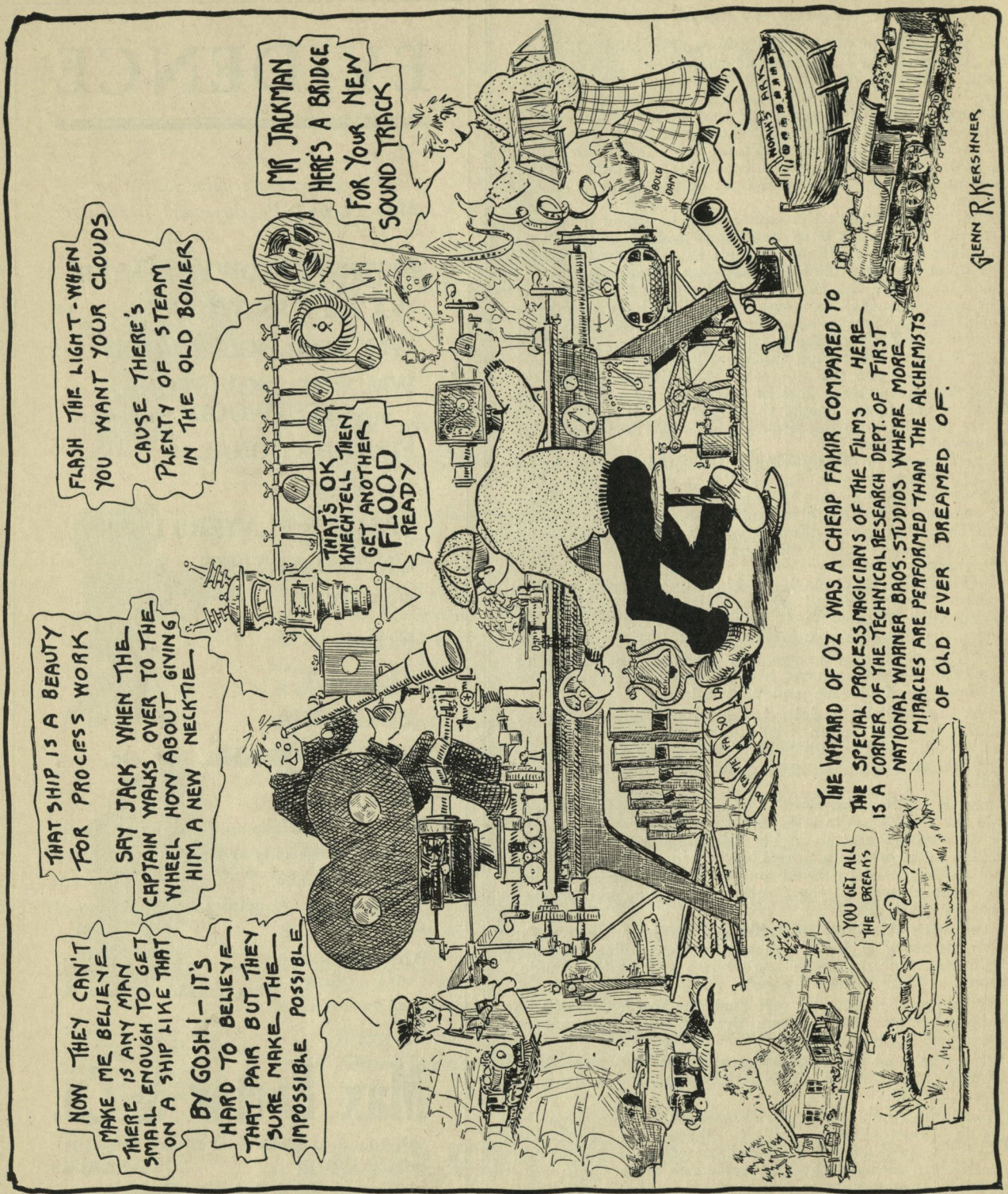
But, like most of the cameramen, he would never think to speak of it outside. This writer happened to learn it from a friend.

DeVinna kept in touch with the studio men when he was in Tahiti shooting "White Shadows in the South Seas." Almost daily he flashed messages to the studio officials and received the answers which many times were of vital consequences to the workers in the South Seas.

But cameramen are like that—always doing things and saying nothing.

Al Gilks., A. S. C., has gone to New York to photograph a few sound pictures.

Paul Allen, A. S. C., recently completed a cross index of **The American Cinematographer.** The work involved great labor and much time and is done in his characteristically thorough manner. Mr. Allen also recently gave his time for two days in service to the afflicted girls and boys of the Orthopedic Hospital. Thank you, Mr. Allen.



Dupont Products Exhibit

An interesting feature at the Du Pont Products exhibit on the Boardwalk at Atlantic City recently was a window display of carbon prints from the Bachrack Studios. The prints are mounted on the finest of ivory Pyralin, which has been found particularly adapted to this phase of photographic art as it is stated it will not fade, curl, or buckle, and the prints cannot be erased by ordinary methods. The prints on display include, among others, one of President-elect Herbert Hoover, which is receiving its share of admiration.

The A. B. C. of Sound Pictures

By Joseph A. Dubray, *A. S. C.*

(*Continued from Page 29*)

felt to express these vibrations in a tangible manner so that they could be, so to speak, materialized and seen.

Since sound can be heard in all directions around its source without any change in its quality, it was evident that the knowledge of the behavior of the sound vibrations emitted by **one point** of the sound source and reaching **one point** of the ear should be sufficient for the researcher to reach a complete understanding of all of the vibrations simultaneously emitted by the same source.

It was inferred that the vibrating source of sound imparted a vibratory movement to the nearest particle of carrying medium, say of air, which in turn would impart a similar vibrating movement to the next nearest particle, and on to the third and fourth and so on until a certain particle of air would strike the drumhead of the ear and set it to vibrating.

The shortest distance between two points is graphically represented by a straight line. It is quite logical to visualize the disturbance created by a vibratory movement as following a path diverging from the straight line, but nevertheless traveling in its same direction. This can easily be seen by pinching at any point a taut string. The string vibrates to and fro, although its position remains unchanged.

By visualizing and uniting the subsequent position of the innumerable air particles successively set to vibrate and carrying the purest and simplest forms of sound, a continuous line was obtained having a maximum point on one side of the straight line uniting the two chosen points, a maximum on the other side and alternately crossing it at equal intervals. Such form suggested the name of **curve.**

This curve would have a certain amplitude, or distance, from its peaks to the straight line, and a certain uniform distance between the peaks and the points crossing the straight line.

The amplitude expresses the **loudness** of the sound and represents the movement to and fro of the particles of air while the distance between two peaks situated on the same side of the straight line represent the **pitch** or the **note** which we assign to the sound.

Now, sound vibrations are transmitted from one point to another with the same velocity, irrespective of their loudness or pitch. It is then evident that the closer the peaks of the curve are to each other, the more **frequent** will be the impact of these peaks upon the drumhead of the ear. The number of peaks passing a certain point during a lapse of time of one second has been termed the **frequency** of the vibratory movement and can be measured with great accuracy.

Similarly LIGHT has been constructed to be due to vibrations with the difference that its behavior precludes the possibility that its vibratory movement can be transmitted by the same media which carry sound.

It was Huyghens who, in 1678, expressed the theoretical existence of an elastic, imponderable medium which he called the **ether** and which he supposed to exist everywhere in the Universe, within solids, liquids, gases and which he surmised filled the interstellar spaces.

Here again a point source of light would be a center of disturbance; it would successively set into vibration particles of the ether which, finally entering the eye would excite its retina and so produce the sensation of vision. Here again, vibrations were sent forth in all directions and again the section of such vibrations uniting a point source of light with one point of the receiving eye, could be graphically represented as a sinuous continuous curve similar to the imaginary section of the waves created upon the surface of stagnant water when it is disturbed by, say, throwing a pebble in it.

This similarity of the line representing light vibrations with the cross section of water waves, has given rise to the well-known expression of **light waves** and, by extension the expression of **sound waves,** although notwithstanding the fact that the movement of the latter is represented by similar lines as the former, it must be kept ever present in mind that the light waves present, as water waves, a transverse or up and down movement, while the disturbance of sound is longitudinal and can be visualized as being carried flatly upon the surface of the stagnant water.

It has been previously stated that the transmission of sound and light occurs through vibrations imparted successively to adjacent particles of the transmitting medium. This may be better understood by analyzing the movements of a floating object, a cork, for example, set upon the disturbed surface of water. It will be noticed that an up and down movement is imparted to the cork by the water waves though the cork itself does not advance with the waves.

The apparent longitudinal motion of the waves is then illusory; their movement is merely a motion of particles within the mass while the mass remains stationary.

Similarly the light and sound transmitting media do not actually displace themselves, but vibrations are imparted from particle to particle until they reach the ear or the eye of the listener or observer, whichever the case may be.

The light waves are characterized, as the sound waves, by their amplitude and their length, the first of which determines the **brilliance** and the second the **color** of the light sensation transmitted to the brain.

Although the truth of the undulatory theory for light has been relatively recently challenged and an electromagnetic theory is rapidly gaining favor, the wave theory holds its popularity because, notwithstanding its simplicity, it permits a scientific explanation of all the phenomena of light such as the phenomena of reflection, of refraction, of interference and of polarization.

When the light of the sun strikes, say, a tree, its leaves absorb some of the light waves and reflect others, and these reflected waves are those which reach the eye of the observer and are of **the wave length which characterizes the green color of the leaves.** Similarly, the trunk of the tree will reflect only the light waves which characterize its particular color, while the image of the tree is formed on the retina by the optical system of the eye. Thus a perfect image of the tree through the eye is transmitted to the brain and the tree is said to be **seen.**

Since an object can be seen because it reflects some particular vibrations of the ether and since a sound can be heard because it causes the medium into which it travels to vibrate, it is quite logical to conceive the possibility of reproducing the visibility of an object or the audibility of a sound by forcing the ether or the sound transmitting medium to vibrate in the same form, amplitude and frequency of waves as those which have produced the original sensation.

Thus a painter, after outlining on canvas the **form** of the tree, will apply to the canvas substances (paints) which reflect only the light waves corresponding to the green of the leaves or the browns of the trunk in their proper position and relation, and that painting when looked at will, at any time, any place, give to the eye the impression of seeing the tree, the faithfulness of reproduction depending, of course, upon the skill of the painter.

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Ray, Bernard B.—
Rees, Wm. A.—Warner Bros. Vitaphone

Schmitz, John J.—
Smith, Jean C.—

Tappenbeck, Hatto—Fox

Van Dyke, Herbert—M.-G.-M.

Westerberg, Fred—United Artists

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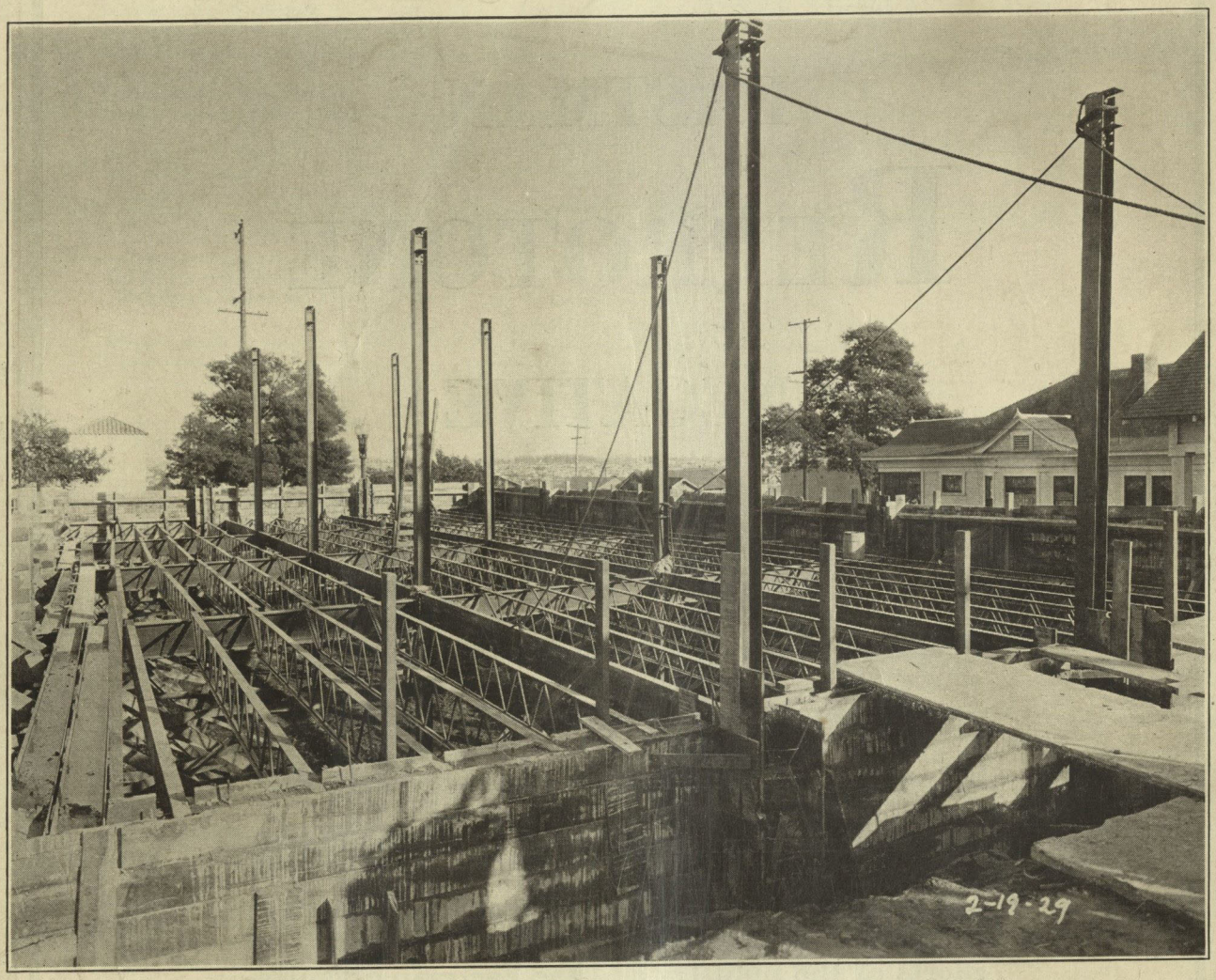

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